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MANUAL OF

ARTICULATION TEACHING

By D. GREENE.

PART I.

NEW YORK :
PUBLISHED BY THE INSTITUTION FOR THE IMPROVED INSTRUCTION OF DEAF-MUTES,
Lexington Avenue, Between 67th and 68th Streets.
1894.

Press of J. J. Little & Co.
Astor Place, New York

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TO

PROFESSOR ALEXANDER MELVILLE BELL

WHOSE EXCELLENT CONTRIBUTIONS TO THE LITERATURE OF THE SCIENCE OF VOCAL PHYSIOLOGY RENDER THE MOST PRACTICAL AID TO ARTICULATION TEACHERS, THIS TREATISE IS DEDICATED AS A MARK OF THE AUTHOR'S ESTEEM AND ADMIRATION.

PREFACE.

By far the greater number of principles and theories which are advocated in this little volume did not originate in my mind. I adopted them after a good deal of thought and study and experiment. Being anxious to gain information from any source whatever, and to make use of anything that might be beneficial to my pupils, I have always tried to get hold of every book and periodical from which I thought I could gather knowledge that might directly or indirectly aid me in my work of giving speech to the deaf. I would gladly mention the names of all those whose ideas I have made my own, and whose suggestions I have followed in working out the system of instruction which is described herein, but refrain from attempting to do so, because I am afraid I might not remember them all; and, therefore, take this way of expressing my grateful acknowledgments to every one of them.

This manual is designed not only for the professional teacher, but also for the mother who is anxious to gather information that will be sufficient to enable her to teach a little deaf child at home for a while, till it is old enough to be sent away to a distant school. Such mothers might shrink from undertaking the task if they found that they would have to study a bulky volume in order to prepare

themselves for it. Hence it was thought best to make this book as small as possible. But although it is small there is enough in it to give any person of common sense a good idea of what is to be done with a beginner in articulation, and how it is to be done. After all, the teaching of speech to the deaf is not, as some people believe, such a wonderful, mysterious art that only those few can master it who are naturally gifted with such special talents as ordinary mortals do not possess; and a description of it may be full without being particularly voluminous. In this connection I will also say that, in my opinion, our work does not require such a marvelous amount of patience as many seem to think. Perhaps my enthusiasm for it gets the best of my judgment, yet I must say that it is the most fascinating work, and I do not see how anything that is so highly interesting can be a tax on anybody's patience.

The chapter on the preliminary examination of new pupils may seem out of place. But since this treatise is designed for parents of deaf children as well as for teachers, it was thought proper to treat this subject fully, and to describe all the symptoms of feeble-mindedness, so that any mother, reading these pages carefully, might be able to decide for herself whether her child does not learn to speak on account of deafness or on account of mental weakness.

Perhaps some will think that the chapter on respiration is unnecessarily long. But defects in the articulation of deaf children, resulting from mismanagement of

the breath in speaking, are of such common occurrence and often of such a serious nature that too much cannot be said under that head. The more the teacher knows about the mechanism of breathing, the better work she will be able to do. I would advise every articulation teacher to go farther, and study this subject in some standard medical work.

New York, *October*, 1894.

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MANUAL OF ARTICULATION TEACHING.

PROPER AGE OF BEGINNING.

There is probably no limit as to how late in life a deaf person may begin to learn how to articulate or to read the lips with the prospect of success. The old rule, "Better late than never," seems to hold good in regard to this as well as in other matters. Some years ago a congenitally deaf lady of thirty-three years of age, who had been educated in a sign school, and who was very anxious to learn how to speak and read the lips, came to me for advice and assistance. I referred her to one of the teachers of my school, who subsequently gave her private lessons, and she learned to speak beautifully in a few months. A gentleman occupying a very high position in the United States Navy became deaf, and commenced to study lip-reading under an experienced teacher. Although over sixty years of age, he mastered the art well. But, while there seems to be no limit as to how old a deaf person may be when beginning to learn to speak, there is, undoubtedly, a limit as to how early the instruction of a deaf child should be commenced. I am inclined to think that the age of eight years

is the best for beginning the regular school instruction of such a child in articulation and lip-reading. In my experience as a teacher of the deaf, I have invariably found that, other things being equal, those children whose instruction was commenced when they were about eight years old made more satisfactory progress from the start, and became better articulators in the end, than those who began when they were younger. At any rate, there is nothing lost if a deaf child is not sent to school till it has reached the age of eight years. The idea seems to be quite wide-spread that the training of the vocal organs of such a child must be commenced very early, lest these organs should become stiff and unwieldy from want of use, and never acquire that degree of flexibility which is requisite for fluency of utterance. Hence, parents often apply to us for the admission to our schools of little deaf children, three or four years of age. Now, it is possible that the vocal organs of such children might become more lithe if they could be properly trained at that early age. But it is useless to speculate on the possible effect of such early training on the vocal organs, because you cannot teach a deaf child to articulate to any extent at the age of three, any more than you can teach it how to write at the age of one year. It may learn to say "papa," "mamma," and a few other little words of simple pronunciation, but all at-

tempts to teach it how to form more difficult combinations of sounds must result in failure and will do more harm than good, because the intellectual powers of a three-year-old deaf-mute are not sufficiently developed to enable him to comprehend the intricate movements which the vocal organs have to perform in the articulation of the sounds of speech, and to learn how to control these movements by means of muscular consciousness. If at that early age he learns to repeat a considerable number of sounds, he will probably pronounce most of them very imperfectly and thus form faulty habits of articulation which it may be very difficult, if not impossible, to eradicate. But while I am strongly opposed to regular articulation drill for deaf children while they are very young, I do not mean to convey the idea that they cannot and should not receive any training whatever until they have reached what I consider the proper school age. On the contrary, I think that a great deal can and should be done for them either at home or in schools that are especially designed for them. The use of a slate and pencil should be encouraged at as early an age as practicable. Drawing of straight and curved lines and of simple objects, as well as copying of the letters of the alphabet, may be taught. The first numbers of writing and drawing books that are used in the common schools may be placed in the hands of the child for regu-

lar practice. If there is a kindergarten in the vicinity, the little mute should, by all means, be sent to it. Although he will not be able to take part in all the kindergarten exercises, he will be able to participate in some of them, as stick-laying, weaving, braiding, stringing of beads of different colors, drawing, etc. If he cannot be sent to an establishment of this character, his mother or sister should procure an ordinary kindergarten guide and select such exercises as may prove interesting to him. The necessary materials to be used in these exercises can be bought for a trifling amount of the Milton Bradley Co., New York City, or of E. Steiger & Co., of the same place.

Every deaf child of sound mind forms a language of natural gestures of its own, by means of which it expresses its wants and communicates its thoughts and feelings. Parents have sometimes told me that they would not allow the child to use these natural signs for fear that their use might afterwards hinder it from acquiring speech when it is sent to school. It is a mistake to do this. Parents should watch these signs, so that they may learn to understand them and become able to converse freely with the child. When the little fellow has learned to articulate words and phrases, then it is eminently proper to make him speak and discard signs; but since the latter form his only means of communication at the time

being, his mental development will be hindered if he is forbidden to use them. Yet he should be trained early to read the lips. The gestures used in addressing him should always be accompanied by the corresponding words, and constant efforts should be made to teach him to recognize words on the lips when they are spoken to him. He will, of course, not succeed at first, but if the practice be persevered in, he will in due time learn to recognize, and very likely try to imitate, those words which occur most frequently, as the names of his brothers and sisters, of articles of clothing and food, etc. He will also learn to understand little verbal directions and short questions. His articulation, which he will thus acquire spontaneously, will in all probability be imperfect, yet those who are constantly around him will become accustomed to it, and most likely be able to understand it, just the same as mothers and nurses generally understand the prattle of a young hearing child, although it may be unintelligible to strangers. This practice in articulation will be of great benefit to him. It will strengthen his voice and create in him the desire to use speech, so that afterwards when he goes to school and receives regular instruction in speech and lip-reading, he will be more apt to make practical application of every spoken word as soon as he has mastered it. I have mentioned previously that

in my opinion the regular instruction in articulation should not be commenced till the deaf child is eight years old, and just now I have spoken of the advantages which such a child may derive from an early use of his voice. The two statements may seem to be at variance with each other, but they are not; for, while I do not consider it advisable to compel a very young deaf-mute to articulate words and phrases indiscriminately, whether they are too difficult for him or not, yet I see no harm in allowing him to imitate voluntarily a limited number of little words, the pronunciation of which he finds easy enough to attempt.

PRELIMINARY EXAMINATION.

The rules of a school for deaf children generally require that applicants for admission shall pass a satisfactory examination as to their capabilities of being educated. The points to be ascertained through this examination are: 1st, the degree of the child's intelligence; 2d, the degree of deafness—whether total or partial; 3d, the quality of its voice; and 4th, its capacity of imitating sounds.

TESTING THE INTELLECT.

A good picture book, like "McLoughlin's Object Teacher," for instance, will be found of great aid in these examinations. Applicants generally feel

strange and timid when they are first brought to us, and it is as good a way as any of opening communication and getting acquainted with a timid little mute to show him bright-colored pictures of animals, boats, steam-cars, and such other objects as children usually take an interest in. He will soon forget his timidity, indicate by his gestures that he recognizes the pictures, and express his ideas about the things which they represent. The scope and character of the language of natural gestures which he has formed for himself are the standard by which his mental calibre may be measured. The more intelligent the little one is, the more copious and the more intelligible will be his signs.

If an applicant is too much embarrassed and will not respond to any advances made to him, the following questions may be put to the parents, and from the answers to these questions, it may be judged to some extent whether the child's intelligence warrants the attempt to educate him or not.

1. In trying to make known his wants, does he merely point at objects, or does he make appropriate signs for them?

2. Do you generally understand his signs?

3. If he sees something unusual in the street, does he, on coming home, give a full and correct account of what he has seen?

4. Does he play with his brothers and sisters, and do they understand his signs?

5. Does he play with hearing children in the neighborhood, and can he make them understand him?

6. Does he know any day in the week besides Sunday?

7. How far can he count?

8. Can you send him on errands? If so, describe what kind of errands.

9. Does he know the difference between a penny, a half-dime, a dime, or a quarter?

10. If he goes to the store to buy something that costs a penny or two, does he know how much change he has to get on a five or ten cent piece?

Sometimes children are brought to us who have failed to acquire speech on account of mental imbecility, and are, therefore, proper subjects for schools for the feeble-minded. There are two classes of these unfortunates: Some are constantly in a state of mental lethargy, from which they cannot be aroused. They habitually stare into vacancy, and nothing will make an impression upon them. You may show them the most interesting object or picture, and they cannot be induced to look at it. Others are attracted by everything they see. Their faces brighten up when something new is shown to them, but their

attention is like a flash of lightning, and lasts but a moment. They jump from one thing to another, and are entirely unable to fix their minds long enough upon one object to receive a lasting impression of it. Their eyes are perpetually wandering, and their bodies are hardly ever still. It is not difficult to recognize such hopelessly idiotic children, and whether they can hear, or have the additional misfortune of being deaf, they do not belong in our schools, and must be rejected. But there are certain doubtful cases in whom partial or total deafness is combined with more or less weakness of the intellect, and this fact renders the task of examining them exceedingly difficult. In some of these cases it seems almost impossible to form a fair estimate of the child's mental condition by ordinary tests. Hence, it occasionally happens that applicants are rejected that might be benefited by the methods prevailing in our schools. Once a little deaf boy, eight years of age, was brought to me who showed what seemed to me unmistakable symptoms of idiocy. After examining him most thoroughly on two different occasions, I assisted in procuring his admission to an asylum for idiots. He had previously been examined by one of the Nestors of our profession, who pronounced him hopelessly idiotic; but I did not become aware of this fact until after I had given my opinion of the case. When the little fel-

low had been under training for six weeks at the asylum I saw him in his class-room, and was astonished at the improvement he had made. His teacher had a number of cards on which the names of common things were printed. She held up one of the cards with the word *thumb* on it. He immediately showed one of his thumbs, then he showed his other thumb, and then he took hold of my thumbs. In a similar manner he manifested that he had learned to recognize the printed forms of the names of a considerable number of familiar objects. He had also commenced to use a pencil and form the letters of the alphabet. The superintendent of the asylum agreed with me that this boy properly belonged to an institution for the deaf, and the necessary steps for his transfer were soon taken.

Another case in point is that of a little boy, nine years old, who was brought to my school by the advice of the superintendent of an idiot asylum in which the little fellow had been placed, after having been on trial for some time in two different institutions for deaf-mutes and given up as a hopeless imbecile. He remained two years with us, and the improvement which he made during that time was rather above the average. Having partial hearing, he learned to speak very distinctly; he became a good lip-reader; he remembered language well; his penmanship was good;

he learned to draw nicely, and he was quick in arithmetic.

I could mention more errors of this character which I have made, or which were made by others and came to my notice, but refrain from doing so, as those which I described are sufficient to show that great care and caution must be used in deciding whether a doubtful applicant should be admitted to one of our schools or not. If one of these little unfortunates shows too much embarrassment to be properly examined, this may be taken as a favorable symptom, because a real imbecile does not know enough to become embarrassed. In the course of years I have admitted on trial a number of children who appeared doubtful in every respect, and who, during their entrance examination, gave no other evidence of intelligence except bashfulness. In every instance I found afterwards that they made sufficient advancement to warrant me in retaining them.

Entire lack of any idea of numbers is, in my estimation, a sure sign of great weakness in a child's mind. Although we sometimes find lightning calculators among the dullest of our pupils, just the same as we sometimes find expert draughtsmen or other forms of abnormal development among them, and the ability to count and understand numbers cannot therefore be taken as reliable evidence of mental vigor in general, yet if I

show a box of marbles or little cubes to an applicant over six years of age and I cannot make him understand to pick up two, three, or four at a time, he would have to stand some of my other tests pretty well before I could make up my mind that it would be worth while to attempt to teach him to read and write, or to speak.

If it be found that a candidate for admission, whose eligibility appears doubtful, can distinguish forms and colors, it seems that he gives promise of being able to learn, in due time, to recognize the forms of the different letters of the alphabet and the various shapes which the mouth assumes during the movements of articulation. To test the ability in this regard, I put before him a box of beads all of the same shape but of different colors, and a box of little tablets all of the same color but of different shapes, and require him to assort them. Building with blocks, arranging little sticks so as to make certain forms, or any childish game, can be made the means of finding out whether an applicant is capable of fixing his attention upon a subject, and whether he has any reasoning faculties.

In the case of a young child that appears doubtful, it is well to reserve the decision and advise the parents to bring it again for examination after one or more years, according to circumstances. We may notice a wonderful change for the better in such a child after the lapse of a

year or two. I remember particularly one little girl whom I was inclined to give up as hopeless when she was first brought to me, at the age of six. I saw her again when she was ten years old, and found her so much improved that I admitted her at once. Her progress was quite satisfactory from the beginning, and continued to be so to the end of the time that she was in school.

TESTS OF HEARING.

To ascertain whether an applicant is totally or partially deaf is not always so easy a task as some may be inclined to think. If the parents state that the little fellow has never been known to turn around when his name is called, or to pay any attention to loud voices, their statements in this regard may generally be relied upon, and it may be taken for granted that he is totally deaf. But when they say, as they often do, "Sometimes he seems to hear perfectly well, and at other times he does not hear at all," or, "He can hear perfectly well, but does not understand the meaning of the words," then it is necessary to make the most thorough test of the child's hearing for reasons which will presently become apparent. Take, for instance, the second of the two doubtful cases which were described in the last paragraph. On testing this boy's hearing, I found that he could hear well all the vowel sounds, except *o* and

e; he could distinguish through the ear most of the consonants when spoken in an ordinary tone of voice; he could not hear *s, z, sh, ch,* and *j,* unless they were shouted into his ear; and the sounds of *d, t, n, f, v,* and *w* he could not hear at all. Now, this little fellow would, of course, turn around every time that somebody spoke behind his back in an ordinary tone of voice. For, although he could not distinguish every sound that was used in a word or a sentence, yet he heard enough sounds to have his attention attracted. He would understand some simple directions that were given to him in spoken language, and carry them out. Hence, people were led to believe that he could hear all that was said to him. He used a number of words, but most of them were spoken so imperfectly that only his mother, who was accustomed to his defective articulation, could understand him. This is not at all surprising, for if we take any group of words and eliminate the sounds of *o, e, d, t, n, f, v,* and *w,* which this little fellow never heard, and therefore had not learned to imitate, and we also leave out the sounds of *s, z, sh, ch,* and *j,* which he heard seldom, then the remainder will form an unintelligible mumbling. A proper examination of children who, like this boy, have imperfect hearing, will generally show the same results which appeared in his case, viz., that some of the sounds of speech are heard perfectly

well, others are perceived only when spoken in a loud voice, and still others cannot be heard at all. The proper way of testing the hearing power of such an applicant is to stand either beside or behind him, so that he cannot see the mouth of the examiner, pronounce the following list of the principal elements of speech and their combinations, and require him to repeat them:

ah (as in *father*), aw (as in *ball*), o, oo, ee.
bah, baw, bo, boo, bee.
dah, daw, do, doo, dee.
fah, faw, fo, foo, fee.
gah, gaw, go, goo, gee.
jah, jaw, jo, joo, jee.
kah, kaw, ko, koo, kee.
lah, law, lo, loo, lee.
mah, maw, mo, moo, mee.
nah, naw, no, noo, nee.
pah, paw, po, poo, pee.
rah, raw, ro, roo, ree.
sah, saw, so, soo, see.
zah, zaw, zo, zoo, zee.
shah, shaw, sho, shoo, shee.
tah, taw, to, too, tee.
vah, vaw, vo, voo, vee.
wah, waw, wo, woo, wee.

Great care must be taken during these tests of hearing, not to injure the ear of the pupil or to

give him pain by shouting directly into it. The examiner should stand behind the pupil and not bring his mouth too near the ear of the child.

Any sound or combination of sounds which the applicant fails to hear is to be noted down, and the examination must be repeated on different days, because the degree of hearing of most semi-deaf persons varies with the weather and the state of the atmosphere. They may hear tolerably well on a bright clear day, and be almost entirely deaf on damp and rainy days.

The tests with the watch and tuning-fork, which aurists generally employ to estimate the hearing power of a patient, are utterly useless for our purposes. A child may be able to hear the ticking of a watch at the normal distance and yet fail to distinguish a number of the sounds of speech. The only reliable way of finding out whether a child's hearing is perfect or not is to try it on every one of the principal sounds of speech separately, as indicated by the list of test syllables which was given above.

TESTING THE VOICE AND THE CAPACITY OF IMITATING SOUNDS.

In order to find out what the quality of an applicant's voice is, and whether he is apt to imitate sounds readily, select some of the little practice words from the list given in the next

chapter, and proceed in the manner described there.

Perhaps some will think that among the points to be ascertained by the preliminary examination of an applicant I should have mentioned the condition of his vocal organs. I have not done so, because those organs are generally in a normal state in deaf children of ordinary health. Cases of malformation of the mouth are as rare among deaf-mutes as they are among hearing and speaking persons. Of all the hundreds of deaf children that I have seen, and that have been under my charge, not one was afflicted with cleft palate, hare-lip, or any similar defect. Once I had a pupil who was tongue-tied, but this did not hinder him from becoming a good articulator. The *l* is the only English sound which one who is tongue-tied cannot give perfectly, but he may learn to articulate it well enough for all practical purposes In passing I will remark here that even at this late date we occasionally hear of a little deaf-mute being pronounced tongue-tied, and having an operation performed on his tongue to cure his deaf-mutism. It is greatly to be deplored that such useless and senseless torture should still be resorted to in this enlightened age. This would not happen if parents wishing to get medical advice in regard to a deaf child would consult a first-class aurist only. Fortunately such is to be found

nowadays in almost any city of the United States, large or small.

FIRST STEPS WITH BEGINNERS.

I. Semi-Mutes.

The great majority of our pupils have no speech whatever when they come to us, but there are some who learned to speak before they became deaf, and have retained their speech either partly or entirely. With pupils of this class the first efforts should be directed towards preserving whatever speech they have. This is most effectually done by teaching them as soon as possible how to read the lips. If the child can read and write, it seems proper to begin by writing down a few simple, familiar sentences, as: How old are you? How do you do? What is your name? Where do you live? The pupil is asked to read the first of these sentences. Then he is required to watch the teacher's lips while she repeats it slowly and distinctly. If he does not understand what she says, she points to the written words before him. Then the next question is proceeded with in the same manner, and so on through the whole list. Knowing beforehand what the teacher is going to say, he is likely to recognize the words on her lips. Next she takes up one of these sentences at random and speaks it slowly, while he

is watching her mouth. Although he does not know beforehand exactly what she is going to say, yet he feels sure that it is one of a limited number of sentences before him, and it is not very difficult for him to guess at it. If necessary she points again to the writing before him. Unless a pupil is very dull, he will get a little start in lip-reading during this first experiment. A deaf person who is familiar with language generally finds less difficulty in reading a whole sentence from the lips of the speaker than a single word, because if he or she catches one or two leading words of the sentence, the rest will be supplied by guessing. Likewise, words of two or more syllables are often more readily understood than monosyllables; and single sounds present the greatest difficulty in the beginning. For this reason it seems best to commence the instruction in lip-reading of the speaking deaf with sentences, then proceed to single words, and leave single sounds for the last exercise.

If a child who lost the sense of hearing after it had learned to speak cannot read and write on entering school, it does not seem feasible to use sentences during the first lessons in lip-reading. I usually proceed with such a child in the following manner: I point successively to several objects at hand, the names of which look dissimilar on the lips, as book, table, paper, boy, etc., pronounce the name of each of these objects distinctly, while

the pupil watches my lips, then I require him to repeat what I say. He may not succeed at once, but he will after a few trials. Next I pronounce the names of these objects promiscuously, and ask him to repeat them after me. If he fails, I help him out by pointing to the object, the name of which I pronounced. From words I proceed to little phrases and sentences in connection with pictures. The use of pictures, such as are found in an ordinary school reader, for instance, is of great help in these lessons.

This seems to be the proper place to remark that the loss of hearing in early childhood is generally followed by loss of speech. I never saw a child, nor have I ever heard of one, who, becoming deaf while under four years of age, retained the power of speech. I have known several who lost their hearing at four, and whose speech was saved through the ingenuity and perseverance of their mothers. But these were exceptional cases. As a rule, a child becoming deaf while under seven years of age will, if left to itself, be almost sure to forget speech in about a year's time. If deafness occurs between the ages of seven and twelve years, there is still danger of subsequent mutism; but after the age of twelve has been reached, speech has become so deeply rooted in the mind that it is not entirely forgotten through loss of hearing, although in some instances

its distinctness is more or less impaired. When a person is pronounced hopelessly deaf by a competent aurist, no time should be lost, but steps should be taken at once to teach that person to read from the lips. In the case of young children efforts should also be made to keep them talking by making them read if they can, inducing them to repeat little rhymes or songs that they learned before becoming deaf, showing them pictures, engaging them in plays and games, insisting on their asking for things at the table; in short, by using all sorts of devices to draw them out and keep their little tongues going. I have often made an exception in the case of such children, admitting them to my school when they were only five years old, and succeeded in saving their natural voices by teaching them lip-reading, and pushing them on from the elementary to more advanced classes as fast as possible, without waiting till they had sufficiently advanced in writing, arithmetic, etc.; thus affording them opportunities for making use of the language which they possess. If they were allowed to remain in one of the lower classes till they are up with the grade in all the lessons, they might lose their speech in the mean time. The unavoidable consequence of this pushing process generally is that the pupil shows later on that the foundation work in arithmetic, etc., has not been properly done. Yet I feel fully justified

in directing all my efforts for the time being toward saving his speech, even at the expense of his general education. For I hold that if a semi-mute becomes a good lip-reader and retains his natural speech, the years that he has spent in school have been profitably employed, irrespective of the progress which he has made in his regular studies. One word more about these speaking deaf pupils, who come to us when they are very young. No matter whether they still speak as well as they ever did or whether they have already forgotten a good deal and speak but very little, I limit myself in the beginning to teaching them to read from the lips and to write such words only as they are familiar with, not attempting for the present the useless task of bringing in new words. Generally six months or a year will elapse before the eyes of such children have been sufficiently trained so that they are able to distinguish on the lips of the speaker words with which they are not familiar. Having formerly been able to hear, their progress in lip-reading is usually slower than that of congenitally deaf children, whose sense of vision has become more acute because it has always been used as a substitute for the sense of hearing. Whenever it is feasible a semi-mute should attend one of our schools as a day-pupil only, so that his time out of school may be spent with hearing and speaking people.

II. Natural and Congenital Mutes.

With children who have no speech whatever when they enter school, the system pursued is as follows: The teacher seats herself with her face to the light and her mouth on a level with the eyes of the pupil, who should not be farther from her than about two feet. When his attention is fixed on her mouth, she points to the corresponding object, and, avoiding all exaggeration, she slowly and distinctly pronounces some little word, like *arm*, *bow*, *eye*, *toe*, *papa*, etc. Then she requires the pupil to repeat the word. If he does not succeed, she places the back of his hand close before her mouth to let him feel the breath which is expelled from her mouth while she speaks; or if he still fails to imitate her, she lets him place one of his hands on her chest to let him feel the vibrations caused there while she sounds her voice. During his first attempts at articulation the pupil is apt to speak either in too high or too low a voice, or in a nasal tone, etc. The various methods of correcting errors of this kind will be described later on.

The following is a list of words that have been found to be well adapted for the first exercises with beginners in articulation: "Papa, bow, toe, arm, eye, ball, fall, tall, home, top, bell, baby, thumb, shoe, marble, I, lamb, boat, hat, water,

doll, mamma, muff, boy, hoop, man, table, flower, lamp, knife, tooth, mouth, fork, belt, horse, whip, bird, cap, comb, brush, barrel, water-pail, chair, cat, shovel, hoe, plough, cars, thimble, shawl, fish, saw, apple, ladder, pole, pan, cow, mat, pipe, hens, gun, hammer, key, girl, book, bowl, towel, hair-pin, soap, pen, bottle, pencil, floor, deer, slate, me, horse-car, paper, woman, sew, boot, broom, window-pole, coat, my, you, I have, I saw."

TRAINING OF THE VOICE.

Pupils of average ability generally succeed after one or more attempts in imitating some of the little practice words which are given in the foregoing list. Occasionally, however, we find one who, either because he does not comprehend what is required of him, or for some other reason, will not use his voice. When you ask him to repeat the word *papa*, for instance, he will move his lips without producing any sound, or he will say the word in a whisper. Such a child will, like all deaf children, use his voice involuntarily on various occasions, as, for example, to express joy, surprise, pain, fear, etc., or to attract the attention of hearing persons when calling them. The teacher has to watch her opportunity, and whenever he uses his voice in this involuntary manner, she must try to induce him to repeat the process, at the same time making him place his hand on

his throat or chest, so that he may become aware of the vibration which is accompanying his voice. Sometimes the following little device will accomplish the desired result. The teacher requires some hearing person to stand with his back to her and to turn around when she calls him, then she asks the pupil to do likewise, viz., make that person turn around by calling him. Another little plan is to roll up a sheet of foolscap, so that it forms a tube of about one inch diameter. The child is required to hold his hand around this paper tube while the teacher speaks into it. He will feel the vibration very strongly, and be most likely to use his own voice when he is asked to apply one end of the tube to his mouth and try to produce the same vibration. I have a pupil in my school now who for three years baffled all the persistent efforts of his teacher and of my own to make him use his voice. When called upon to imitate some little word, he would move his lips without making any audible sound, although he made noise enough while at play with the other children. Finally I hit upon the little device with the sheet of paper rolled up in the shape of a tube, and succeeded at once in making him give voice. He soon became a good articulator. I have never had any other pupil with whom I had to work so long before he learned to speak audibly.

Many of our beginners make the mistake of

speaking in too high a tone of voice. This mistake may be corrected by calling their attention to the stronger vibrations which are called forth by a deeper tone of voice and which may be felt by placing the hand on the chest. A high or head tone is accompanied by elevation of the larynx. The pupil may be made conscious of this by placing the end of his forefinger on the upper end of the Adam's apple. A high-pitched voice is sometimes the result of weakness of the organs of speech, and may be overcome in due time by practice, or as the child grows older and stronger.

If a pupil speak in too high a voice it seems indicated to let him practice first on words containing the vowels *ah*, as in *father*, *aw*, as in *ball*, *oo* as in *foot*, because these vowels naturally have a deep sound ; and avoid for the time being, words in which the sounds of *ee* and short *i* occur, because they are naturally sounded on a higher key.

Another blemish of the voice which the articulation teacher is frequently called upon to deal with is nasality. This will be exhaustively discussed in the chapter on the vocal organs. I will only mention for the present that if a pupil is inclined to speak in a nasal tone, words containing the sounds *m*, *n*, *ng*, should not be introduced until the pupil's voice has become purified.

ORDER OF WORDS.

The teacher should not attempt to teach the practice words in the regular order in which they are given in the list printed on a previous page. For, one pupil will readily imitate some sound combination with which another may struggle in vain for weeks or even months. And there is, apparently, no reason by which this can be explained, as it does not depend upon the degree of intelligence of the individual, nor upon the fact whether he has once heard or not. The list of words referred to is one which in a particular school term was mastered in about two months by the majority of a class of beginners in my school. But it varies with each class. It seems best to experiment on any little word that the teacher or the pupil may have occasion to use for immediate requirements. If the pupils do not succeed in imitating a certain word, it is dropped for the time being and another one is tackled. Almost any deaf child of ordinary ability will imitate some few little words with an approach to correctness. The practice on these few words prepares him for coping with others which prove too difficult at first. Generally, syllables, or words consisting of a consonant followed by a vowel, are more readily imitated by beginners than those in which a vowel precedes a consonant; thus, *papa* offers less

difficulty than *up*, and words beginning with the labials *b*, *p*, *m*, or with the linguals *d*, *t*, *n*, will be articulated by new pupils with less effort than combinations of sounds that are formed farther back in the mouth. Since ease of pronunciation and the particular requirements of our pupils under the special circumstances that surround them are to be the most important factors in the formation of a vocabulary on their part, it goes without saying that the words for their exercises in articulation are selected without any preference to particular parts of speech. If the teacher or the pupil has occasion to use a word, and the latter is able to pronounce it, that word is taken up, whether it be a noun, a verb, or an adjective.

GENERAL RULES.

There are certain rules of a general character which no teacher of articulation should disregard, no matter by which of the prevailing systems she tries to give speech to her pupils. Here are some of them:

1. The teacher's chair should be placed in such a position that the full light from the schoolroom windows falls on her face, so that the pupils may have a good and full view of her mouth. This rule seems to be so simple and so necessary, considering the peculiar condition of our pupils, as to lead one to suppose that every teacher would

naturally follow it. Yet, strange to say, it is more honored in the breach than in the observance. It is not uncommon to see a teacher standing with her back to the light, and the little pupils winking and blinking from the strain upon their eyes while they are trying to follow the movements of her lips. If such a teacher would let some one else take her place for a while and she would try to read his lips in that position, it would not take many minutes before she would become convinced of the painfulness of the task.

2. The teacher should not be too far from the pupils. Although children who have good eyesight and have been under instruction for some time, experience no difficulty whatever in reading the lips of others at a distance of ten or twelve feet, yet it is best that little beginners should sit or stand during the articulation exercises not more than about three feet from the teacher, for they have to watch the mouth more closely than those who have been under training for some time, and they cannot, therefore, do it so well at a greater distance than three feet.

3. The teacher should sit or stand so that her mouth is on a level with her pupils' eyes. If the teacher's mouth should be below the level of the eyes of the pupils, they could not well see what is going on in it, and if her mouth were considerably higher than their eyes, they would have to

bend their heads back and look upward, which cannot be done for any length of time without considerable inconvenience and fatigue.

4. When speaking to the pupil, the teacher should speak as naturally as possible, at the same time as distinctly as possible, carefully avoiding all unnecessary mouthing and exaggerating, otherwise the pupils will imitate her too much and form the habit of grimacing, which, when once formed, is difficult to eradicate. Our aim is to enable the deaf child to understand an ordinary natural utterance, and to speak naturally and fluently himself. This aim will never be reached if we always speak to him in an exaggerated manner, emphasizing each sound particularly.

5. Many of our little beginners in speech are apt to nod their heads after every word they say. Probably they see the teacher do it occasionally, and thinking it is an essential part of what they are required to do, they imitate it. Care should be taken not to let this become a habit.

6. It is advisable to let the pupil practice before a looking-glass—a hand-glass is the most convenient: the child is thereby enabled to see its mouth and compare the movements of its own vocal organs with those of the organs of the teacher. By means of the glass he may also be made aware of any unnecessary mouthing and grimacing.

7. While trying to imitate certain sounds, as *sh*,

g hard, *k* and *ng*, beginners generally require some mechanical assistance, the teacher having to push their tongues into the positions requisite for the formation of these sounds. There are several little instruments that are in use in different schools; but I have found that an ordinary paper-cutter, or paper-folder, as it is commonly called, made of ivory, if it has rounded ends and blunt edges, answers all purposes.

8. The elementary drill in articulation is rather fatiguing to beginners. Therefore, they have to be warned against using too much force in speaking, and no child should be allowed to practice longer than two or three minutes at a time. This rule should also be observed in the correction of errors of the pronunciation of older pupils. Strong, healthy boys and girls have frequently complained to me of fatigue when they were required to repeat a particular sound or combination of sounds a number of times in succession, and quite often I have found myself getting dizzy when, in order to show a child how to pronounce *sh*, *j*, *ch*, etc., I had to repeat those sounds a number of times.

WRITING.

While one portion of the school time in our class of beginners is devoted to articulation drill, another portion of it is spent in teaching the little ones how to write. But so long as they are strug-

gling with the articulation of the first batch of little words, no connection is shown between these spoken words and the written characters by which they are represented. The first writing lessons are not intended for teaching written language, but merely for developing the manual skill requisite for imitating the various strokes of which letters are composed. Beginners generally make more rapid progress in learning how to articulate than in learning how to write. Hence it frequently happens that one can say quite a number of words and understand their meaning before he is able to form correctly a single letter of the alphabet. And this is a great advantage, for spoken words that are acquired in this way become the direct representatives of the ideas which they signify, and when, subsequently, the connection between these spoken words and their written forms is shown, such written forms become a secondary mode of expressing ideas. Thus speech and writing bear the same relations to each other in the mind of our deaf pupil as they have in the minds of hearing people. This principle of teaching the little mute to speak words and understand their meaning before he learns to write them, is a very important one, and should be followed strictly throughout the entire primary course. The pupil should learn to speak words and phrases by reading them from the lips of his teacher. All instruction in language should

be given orally, and no writing whatever should be done during the language lessons proper. Written language should be practiced in separate hours, and the pupil should not be taught how to write a word until he has learned to speak it well, and until he has given proof of understanding and remembering it by making practical use of it when occasion arises. All this is necessary to cultivate in the pupil, as early as possible, the habit of thinking in spoken language, and it is an indisputable fact that nobody can speak a language well before he has learned to think in it. There is no better way of promoting lip-reading than to carry out strictly the principle of teaching spoken language independently of writing. It is evident that if a deaf pupil is compelled to learn all new words and phrases by reading them from his teacher's lips, he will become more expert in the art of lip-reading than if he is constantly aided by having such words written out for him, so that he may read them off and spell them.

I also follow the word method in teaching writing. When the pupil has become familiar with the meaning of the word *eye*, for instance, and has acquired sufficient manual skill to enable him to copy it, I write it down for him and tell him how to pronounce it. I present the written word to him as a whole, and he has to perceive and remember it as such. For the present I leave

him in ignorance of the fact that this written word is composed of three letters, each of which may stand for a number of sounds. There is time enough to initiate him into the intricacies of English spelling later on. We all have to learn to spell by sight anyway, and to recognize words as wholes; hence pupils who are taught by the word method generally become just as good spellers as those who are taught the names and powers of the letters of the alphabet from the beginning.

READING.

The teaching of reading print may be postponed until the pupil has been in school about two years, and in the case of dull pupils even longer. We want to give our little mutes, first, that kind of language which hearing children possess when they enter school; and we want them to learn it in the same manner in which hearing children acquire it. These do not learn to speak from printed pages; hence, it is not expedient to introduce books in our elementary classes, any more than it would be advisable to use books in the nursery. When our pupils come to us they are not yet ready to begin to learn book language. Such words and phrases as they need for expressing their immediate wants are best learned without books. But when the proper time has come for the use of the printed page to enlarge the

pupil's vocabulary, then we also make him acquainted with the powers and with the names of the letters of the alphabet.

THE ORGANS OF SPEECH.

A knowledge of the structure and mode of action of the organs that are concerned in vocal utterance is indispensable to the teacher of articulation. The most thorough knowledge of this kind can be obtained by studying the subject in some medical work, as, for instance, Gray's "Anatomy," Dalton's "Physiology," or Von Meyer's "Organs of Speech." But one who, for some reason or other, is prevented from making such extensive studies, may learn enough for all practical purposes by examining his own mouth and throat and observing their movements.

If you wish to examine effectually the cavities of your mouth and throat, as far as they are visible to the naked eye, place yourself in front of a window, with your back to the light, hold an ordinary hand-glass before you, open your mouth wide, protrude the tongue somewhat, and then examine carefully every part of your mouth cavity that you see in the glass. The observation through the eye may be assisted by placing the end of your forefinger on the inside of the upper front teeth and passing it along slowly upward. You will reach first a small, hard ridge, called

the alveolar processes. These are joined to the hard palate which extends backward about as far as the two rows of the teeth. When your finger gets to this boundary line, you will feel that the hard roof of the mouth suddenly changes to a soft, muscular plate. This is the soft palate. The sensitiveness of the parts will prevent you from proceeding with your finger any farther. But you can observe, by means of the looking-glass, that the soft palate forms a curtain, or veil, hanging obliquely downward and backward, with a small tongue-like appendage in the middle. This little appendage in the middle is the uvula. From each side of the soft palate two folds, or arches, emerge, one going forward to the side of the tongue, and one backward. The space included between these palatine arches is called the fauces. Beyond the fauces, the space at the back of the throat is called the pharynx. The two almond-shaped bodies, which you find situated one on each side of the fauces, in the triangular recess between the anterior and posterior arch of the palate, are the tonsils, of which almost everybody has heard.

If, after this examination of the upper part of your mouth, you direct your attention to the lower portion of this cavity, you will notice, proceeding from the lips inward, first, the lower teeth, then the tongue; and by passing the end of your fore-

finger along the back of the tongue downward, you may feel a little elastic, rigid plate, which has the shape of the bowl of a very small spoon, and rises upward, so that it almost comes in contact with the margin of the soft palate. It is called the epiglottis. (See Figs. 1 and 2.)

FIG. 1.

FIG. 2.

In both figures: *a*, nostrils; *b*, cavity of the mouth; *c*, soft palate; *d*, trachea, or windpipe; *e*, œsophagus; *f*, eustachian-tube; *g*, epiglottis.

Occasionally we find a person who can easily show his or her epiglottis by opening the mouth wide, protruding the tongue, and making it lie flat on the floor of the mouth. I have two pupils in my school at present who can show the epiglottis in the way which I have just described.

Now we come to those parts of our vocal apparatus which are not visible to the naked eye. The first in order is the larynx. "The larynx is a cavity situated at the upper and fore part of the neck, between the trachea and base of the tongue. It is narrow and cylindrical below, but broad above, where it presents the form of a triangular box." It is composed of cartilages.

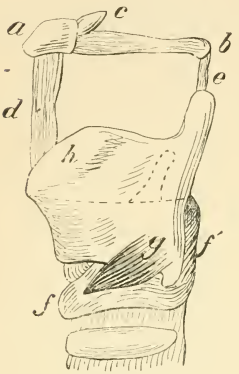

FIG. 3.

Side View of the Cartilages of the Larynx and the Hyoid Bone. *a*, body of the hyoid bone. *b*, great cornu. *c*, lesser cornu. *d* and *e*, ligaments connecting the thyroid cartilage with the hyoid bone. *f f'*, cricoid cartilage. *g*, cricothyroid muscle. *h*, thyroid cartilage. The dotted lines show the vocal chords and arytenoid cartilages.

You can make an external examination of your larynx by means of the sense of touch. By placing your thumb and forefinger on the so-called Adam's apple, or thyroid cartilage, which is the technical name for it, and feeling along from the middle line backward, you can trace the two plates of which this cartilage consists for some distance. By passing the end of your finger along the middle edge of the Adam's apple upward you will reach, first, a soft, yielding part, and then the arch of the hyoid bone, or tongue bone, the two arms of which project backward, and can be followed with the finger for a considerable distance right and left.

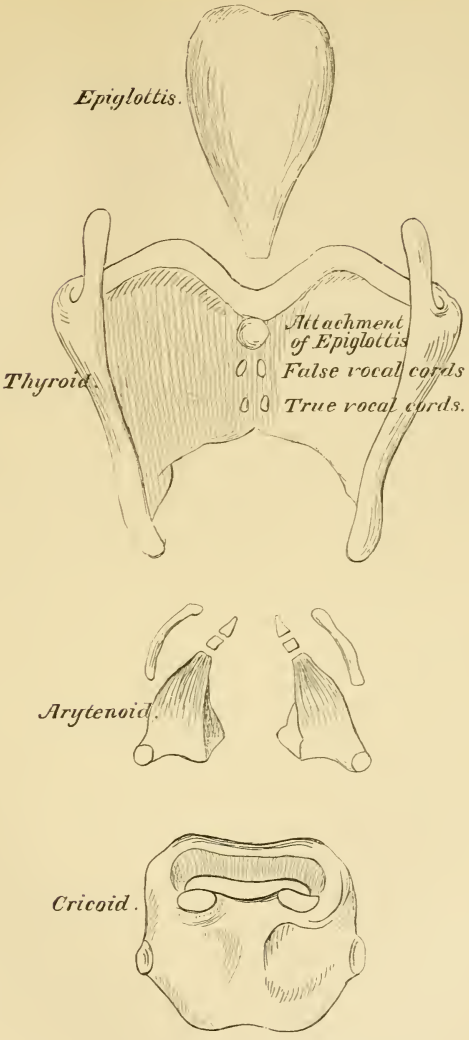

FIG. 4.
The Cartilages of the Larynx.—Posterior View.

Passing the end of your finger along the middle line of the thyroid downward, you will again reach, first, a soft place, but smaller than the one above the Adam's apple, and then you will feel a hard, convex part, which is the anterior portion of the cricoid cartilage. Placing the end of your finger on the soft part immediately above the Adam's apple, and sounding the vowel *o* or *e*, for instance, you will feel a trembling motion. This motion is caused by the vibration of the vocal chords, which are two strong, fibrous bands, placed inside of the thyroid cartilage.

An internal examination of the larynx may be made by means of the laryngoscope. Such an internal examination of the throat is not indispensably necessary as a preparation for articulation teaching, but is highly interesting, and, to a great extent, useful. The only essential apparatus needed to examine some one else's throat is a laryngoscopic mirror, which is a little round mirror about the size of a five-cent piece, attached to a handle at an angle of forty-five degrees. It can be bought of any dealer in surgical instruments for about half a dollar. To examine your own throat you need, in addition, a larger mirror, to reflect the image of the smaller one. Place yourself in front of a window with your back to the light and a looking-glass before you, so arranged that you can get a full view of the interior of your mouth when it is wide open;

then protrude your tongue; while you make it lie as flat as possible on the floor of the mouth, introduce the little mirror and rest its back against the uvula. If, now, you utter the sound *a*, as in *hat*, you will see the image of your larynx. If you do not succeed at once, try again and again. At first, the uvula and the parts surrounding it will probably be too sensitive to endure the touch of the laryngoscope, but they will become accustomed to it after repeated experiments. The little round mirror has to be warmed over a flame, or dipped in warm water, before it is introduced into the mouth, otherwise it will be overcast by the moisture of the breath and its surface will be so dimmed that nothing can be seen in it.

To examine another person's throat, place him in front of you, so that the full light falls on his face, shading his eyes, of course; let him protrude his tongue, and proceed in the same manner as in the examination of your own throat. After some practice you may be able to see through the open glottis into the windpipe. I would advise you by all means to practice on your own throat before you attempt to examine another person's throat. Dr. L. Elsberg's pamphlet on "The Throat and its Functions," published by Edgar S. Werner, editor of the *Voice Magazine*, 108 East Sixteenth Street, New York, will be found of great service by those who wish to practice with the laryngoscope. As

I have already mentioned, such practice is not absolutely necessary, because one may become a successful articulation teacher without it; but it is highly interesting and helpful. It will be shown farther on that the teacher may often find it very convenient and useful to be able to examine intelligently a pupil's throat when any sudden change in his voice takes place.

MOVEMENTS OF ARTICULATION.

If you study the movements of your mouth while speaking before a glass, the first thing that may strike you as being most conspicuous is, that of the two jaws the upper is rigid, being immovably connected with the rest of the skull. Therefore, when any change in the position of the jaws takes place during the act of speaking, it is always the lower jaw which moves, but not the upper. The angle between the two jaws is largest during the pronunciation of the broad Italian *ah*, as in *father;* and it is the smallest during the articulation of the long sound of the vowel *e*, as in *be* or *he*. During the formation of most of the sounds of speech the movements of the jaw are so slight as to be hardly perceptible; and generally the movements of articulation are performed by the soft parts of the mouth, namely, the lips, the tongue, and the soft palate. The movements of the lips are twofold, viz., first, passive, and

second, active movements. Passive movements of the lips are those which are the incidental result of the depression and elevation of the lower jaw; as, for instance, in the sounds of *a* in *far*, *a* in *ask*, *a* in *add*, and short *e* in *end*. Of active movements of the lips we may again distinguish four different kinds: first, spreading of the lips, as, for instance, in long *e*; second, rounding of the lips, as, for example, in the pronunciation of *o* in *odd*, or of *a* in *all*, of *o* in *ore*, of *o* in *old*, of *oo* in *moon*—in the pronunciation of all these sounds, the lips have to be rounded to a greater or less degree; third, protruding of the lips, as may be noticed when the sound of *sh* is given, as in *shawl*, *shoe*, etc., or in the sound of *w*, as in *water*, *wood*, etc. —when the lips are protruded, they are, of course, rounded at the same time; fourth, pressing of the lips against each other and opening them rapidly, as in the sounds of *p* and *b*. It may also be observed that in some articulations the lower lip alone moves independently of the upper, as in *f* and *v*, in which the lower lip is brought in contact with the upper teeth. In the beginning students of articulation teaching are apt to involuntarily concentrate all their attention upon the action of the tongue and the throat, and to overlook the movements of the lips entirely. They should take care not to fall into this error, as the lips play an important part in the articulation of the sounds

of speech, and especially in the formation of the vowel sounds, as will be fully explained farther on.

We will now consider the movements of the tongue. This organ is capable of performing a great variety of movements. To examine systematically the principal ones of these movements which are employed in the articulation of the sounds of speech, it is well to observe, first, those movements which are made by the fore part of the tongue; second, those of the middle part; and, third, those of the back part of the tongue. You may observe that the fore part of the tongue is brought into complete contact with the palate in the formation of the sounds of *t*, *d*, and *n*; it is applied to the palate in such a manner as to leave openings on both sides in *l*; it is presented to the upper gum in such a manner as to leave a small central opening for the emission of the breath when the sound of *s* or of *z* is produced; it is turned upward so as to assume the shape of the bowl of a spoon without contact with the gum, in the pronunciation of the sound of initial *r* in *room*, *raw*, *rib*, etc.; it assumes the same position but is drawn farther inward in the sound of *sh*, also in that of *zh*, as heard in the pronunciation given to the letter *s* in the word *pleasure*. A close examination of the movements of the middle part of the tongue will show that this portion is never

brought into complete contact with the palate in the pronunciation of any of the sounds that occur in the English language, but it is raised and approximated to the roof of the mouth, so that an open place is left for the breath to pass out in the formation of the sounds of short *e* in *edge*, of short *i* in *ill*, of long *e* in *eel*, and in the consonant sound of *y*, as in *yard*, *yes*, *year*, etc. The only movement of the back part of the tongue seems to be that in which it is brought into complete contact with the palate, as in the sounds of *k*, *g* hard, and *ng*

The next thing in order is the consideration of the movements of the soft palate. This organ being placed far back in the mouth, its movements are not open to our view, and cannot, therefore, be studied from direct observation. For this reason it seems proper that I should briefly state what some scientists, who have ascertained the movements of this organ by various experiments, tell us on this subject. They all agree that the soft palate plays a most important part in the function of speech. During the utterance of the various sounds of speech the breath, or voice, as the case may be, has sometimes to be emitted through the mouth and sometimes through the nose. During the formation of all pure oral sounds, whether vowels or consonants, the nasal cavity has to be entirely shut off from the expiratory current of air,

so that the latter can pass out through the mouth only; whereas, in the pronunciation of the so-called nasal sounds, the mouth has to be closed and the current of air has to pass through the nasal cavity. This closing and opening of the cavities of the mouth and nose is accomplished by the movements of the soft palate. When the soft palate is raised and brought into contact with the back part of the pharynx, it shuts off the breath or voice from the nose. (See Fig. 2.) When it is lowered so that it rests on the back part of the tongue, it prevents the breath or voice from passing out through the mouth. This action of the soft palate was, after much controversy, clearly proved by the Austrian scientist, Johann Czermak, in the following manner: A thin wire was bent twice at right angles in the same plane. To one end a small ball of wax was attached, and the wire was then pushed through the nose till the wax ball lay on the posterior surface of the soft palate; the other end of the wire hung as an indicator before the mouth. The German vowels were then uttered in the following order: *ah* as in *father*, *a* as in *at*, *o* as in *ore*, *oo* as in *poor*, *e* as in *see*. It was observed that the indicator rose very slightly for *ah*, but more and more for each of the other vowels successively, attaining the greatest elevation with the vowel *e*. The order of the vowels was then reversed, and the indicator gradually sank till,

when *ah* was no longer audible, it had resumed its former vertical position. This experiment proved that the greatest elevation of the soft palate occurs during the pronunciation of the vowel *e*, and that the elevation gradually diminishes when the vowels are uttered in the succession of *ee*, *oo*, *o*, *a*, and *ah*. *Vice versâ*, the least elevation of the soft palate takes place during the utterance of the vowel *ah*, and it gradually increases as we pronounce successively the sounds of this list in a reverse order. Similar tests with the sounding-wire, applied during the utterance of consonants, proved that the greatest elevation of the soft palate is caused by the voiceless consonants (see paragraph treating of the movement of the larynx), whereas in the voiced consonants the ele-elevation is less. During the pronunciation of the sounds of *m*, *n*, and *ng* the wire indicated that the soft palate was not raised at all, which result was, of course, to be anticipated because they have to be emitted through the nose only; their correct formation, therefore, requires complete closure of the mouth passage. Professor Czermak further demonstrated in several ways that not only the degree of the elevation of the soft palate varies in the different vowel sounds, but that the degree of tension of the soft palate, or the amount of pressure which this organ exerts against the wall of the pharynx, is also increased or diminished in the same propor-

tion as its elevation is greater or less. He mentions the following experiment which he performed on himself. Lying down on his back, he had some water injected through a small tube into the back part of his nasal cavity while uttering the vowel *ee*, and found that the water remained there and did not run down into the lower part of the pharynx; this was also the case when the vowels *oo*, *o*, and *a* (as in *at*) were uttered; but the water entered the pharynx at once, or very soon, when he pronounced the vowel *ah*. The tension of the soft palate had, therefore, been sufficient to support the superincumbent water till the vowel *ah* was uttered, when it became too weak to accomplish that purpose. That, however, there is a closure of the nasal passage even in the utterance of the vowel *ah*, was shown in a different manner by another scientist named Passavant. The latter repeated Czermak's experiment, but used milk instead of water; the advantage being that milk could be more easily seen than water, by reason of its white color, when escaping down the pharynx. The results of Passavant's experiments were the same as those which Czermak had obtained. He resorted, however, to another method to discover whether the escape of fluid, which accompanied the utterance of the vowel *ah*, was due to imperfect closure, or whether it was caused by the weight of the fluid forcing open a closure which otherwise

would have remained perfect. A wire of the thickness of a strong thread was bent twice at right angles in the same plane and carefully introduced into the nose till one end could be seen through the open mouth hanging down below the free margin of the soft palate, the other end projecting from the nose. Upon moving this outside end, the part of the wire hanging down the pharynx could be distinctly seen to move slightly from side to side. While, however, the vowel *ah* was uttered it was no longer possible to produce this motion, which showed that the contact between the soft palate and the posterior wall of the pharynx is so perfect while the vowel *ah* is uttered that a wire of the thickness of a common thread will be held fast. The conclusion to be drawn from all that has been said on this subject is, that during the production of all pure oral sounds, whether vowels or consonants, the soft palate shuts off the nasal cavity from the mouth almost completely, so that the expiratory current of air can only escape through the mouth, and hardly any portion of it can pass out through the nose.

The experiments which have been described are rather unpleasant and fatiguing for any one to try on himself. But Professor Czermak mentions another experiment which is very simple, and which nobody will hesitate to perform on himself. It is also of the greatest practical value to us in our

work of articulation teaching, as will appear presently. To find out whether in the production of any sound the breath is emitted through the nose or not, he holds a small hand-mirror or any polished surface, such as the blade of a knife, for instance, horizontally under the nostrils while speaking, and observes whether any moisture forms on it or not. The least trace of a breath of air escaping through the nose during the articulation of a sound will at once manifest itself by the precipitation of water vapor on the cold glass or metal. In regard to sensitiveness and convenience for use, this device with the polished surface does not leave anything to be desired. By means of it, anybody can convince himself that during the correct pronunciation of the pure vowels no breath escapes through the nose, and that, therefore, the contact between the soft palate and the pharynx, as well as the resulting closure, is complete. To make the test correctly, the vowels should be prolonged somewhat, the mirror should be placed under the nose after the voice has commenced and be removed again before the voice stops, otherwise it may be overcast from your breathing before or after you sound the voice. The mirror is far more sensitive, and therefore more reliable, in testing the purity of a sound, than the ear. For some people, either through carelessness or bad habit, or through abnormal

condition of the vocal apparatus, do not make the closure of their nasal passage complete while speaking, a fault which the mirror will reveal at once, although the voice may thereby not be made sufficiently nasal to be discovered as being so by the ear.

I have dwelt at such length on this subject, because it is of the utmost importance for us in our school work, and because without a thorough understanding of it we may find it impossible to correct and purify a nasal tone of voice, which is a very common defect of utterance among deaf articulators. There is not the least doubt that this most disagreeable blemish of the voice is always caused by insufficient contact between the soft palate and the posterior wall of the pharynx, a portion of the breath or voice being thus allowed to escape into the nasal cavity. In our pupils this imperfect closure is sometimes due to swollen tonsils, which impede the elevation of the soft palate; or it sometimes is the result of weakness of them uscles of the soft palate. If a pupil speaks in a nasal tone of voice on account of swollen tonsils or some other physical defect, he has, of course, to be placed under medical treatment. The teacher should examine the mouths and throats of her pupils from time to time, especially when she notices any changes in their voices. Cases of enlargement of the tonsils, elongation of

the uvula, inflammation of the mucous lining of the pharynx, and kindred ailments are of frequent occurrence among my pupils. The climate of New York is particularly trying to the throat, but probably the great strain upon that organ incident to the use of artificially acquired speech is apt to aggravate its susceptiveness to disease.

In regard to weakness of the muscles of the soft palate as a cause of nasality of the voice, I will say that I am inclined to think that many of our beginners in articulation let the voice escape through the nose because the muscles of their soft palates are insufficiently developed from want of use. For, in ordinary breathing for vital purposes the soft palate rests on the back of the tongue, closing up the mouth passage and permitting the air to pass in and out through the cavities of the nose. It is only in speaking that the soft palate has to be raised. Now, those of our pupils who have not been accustomed to speaking before they came to us, have not had occasion to make frequent use of the muscles which are employed in raising the soft palate; hence these muscles have remained weak, and it is only after considerable practice that they acquire the degree of strength which is requisite for the performance of their function.

There are several methods of remedying the defect of nasality of the voice, provided that this

defect is not the result of a diseased state, or of malformation of the organs of speech. A very excellent method of this kind is recommended by Mr. A. Melville Bell. He says: "Let the student place himself before a glass—his back to the light—and, opening his mouth, inhale breath deeply, but noiselessly. If he do not, in this process, elevate the soft palate and depress the tongue so as to form a visible arch of considerable height and breadth, he will be the better of practice for that purpose. Let him retain the soft palate at the elevation he obtains, as long as possible, dwelling on the open vowels *ah* and *aw*, without allowing it to fall. He will distinctly *see* the position of this organ in sounding these vowels, and he may be able, by sensation and partial observation, to maintain it in the same position in sounding the closer vowels *e*, *eh*, *oh*, *oo*, etc. In this way a nasal tone will be purified, and that most disagreeable blemish of speech removed." I wish to call special attention to Mr. Bell's selection of the open vowels *ah* and *aw* for the exercise in purifying a nasal voice. The fault of speaking in a nasal tone may show itself in the pronunciation of any of the sounds of the alphabet, vowels as well as consonants; but if it exists at all, it is more marked in the close vowels *ee* and short *i* than in any other sound. The reason for this is that in these close vowels the back of the

tongue has to be raised and brought in close proximity to the roof of the mouth, which movement is apt to deflect the current of air from the mouth and to send it out through the nose. Another reason, probably, is that, as Czermak and others have demonstrated through their experiments, the pressure of the soft palate against the wall of the pharynx has to be greater in the vowel *ee* than in any other vowel sound; and in the pronunciation of the open vowels *ah* and *aw* a portion of the breath may escape through the nose without marring these sounds to any considerable extent. Now, since it is one of the best rules in teaching to make the first steps easy, it is advisable to select the open vowels *ah* and *aw* for practice in our attempts at purifying a nasal tone.

Mr. A. Melville Bell's method is undoubtedly the best and the surest. It should therefore be applied with all pupils who are old enough and intelligent enough to comprehend it. But it is best adapted for older students. At the age at which our pupils come to us, very few of them are mature enough to comprehend what is required of them in this experiment. It therefore seems preferable in the case of our little beginners in articulation to make use of the hand-glass in the way suggested by Czermak. I have never found a pupil who did not at once understand what was wanted of him when he was shown that when he

pronounces a vowel in a nasal tone, the breath escaping through his nostrils causes two corresponding round spots of moisture to appear on the hand-glass which is held under his nose; whereas, when I pronounce the same vowel in a pure tone the hand-glass which is held under my nose remains clear. In trying this experiment it is best to let the pupil face the light, because he will then be better able to see the spots of moisture forming on the glass.

We frequently find that a deaf child will speak the vowels through the nose when they are either preceded or followed by one of the nasal consonants *m*, *n*, *ng*—as in *no*, *on*, *in*, *ten*, *nine*, *mine*, *man*, *moon*, *long*, etc.—but will give pure vowel sounds in other combinations that do not contain nasal sounds. The reason is that they open the nasal passage too soon; as, for instance, in the pronunciation of the word *on*, they open the nasal passage as soon as they start to say the word, in anticipation of the nasal sound *n*, instead of waiting till the *o* is finished. Or they they fail to close the nasal passage at the proper time, as in the word *no*, in which it has to be opened for the initial *n* but must be closed again before the following *o* is sounded. Faults of this kind can be easily corrected; all the teacher has to do is to call to the pupil's attention that in these combinations the *m*, *n*, and *ng* only have to be sounded through the

nose, but in pronouncing the other elements th[e] full breath must be emitted through the mouth and a strong vibration felt in the chest. The hand-glass will be found a useful aid in making corrections of this kind.

MOVEMENTS OF THE LARYNX DURING ARTICULATION.

If you place the end of your forefinger on the upper end of the Adam's apple, and give successively the powers of all the letters of the alphabet, you will feel a vibratory movement of the larynx, when some of these sounds are pronounced, but while others are uttered the larynx remains perfectly quiet. This vibratory movement, which is caused by vibrations of the vocal chords, can easily be felt during the utterance of all the vowels and all the nasal sounds; whereas, during the formation of the sounds of *p*, *t*, *k*, *f*, *s* (hard), as in *soap*, *seven*, *ships*, etc., *sh*, and *ch*, the larynx remains perfectly quiet. But it resumes at once its peculiar trembling movement when the sounds of *z*, *v*, *j*, or *y*, as in *young*, *year*, etc., are pronounced. This difference between vocalized and non-vocalized sounds appears most striking if while you repeat the sounds of the alphabet you shut up your ears tightly with the ends of your fingers. The least sound of the voice manifests itself as a roaring noise in the ears; whereas, the degree of loudness

of the non-vocalized sounds is not altered in any way. If any one is in doubt whether a certain element of speech should be sounded with or without voice, let him pronounce that element with his ears stopped up with the ends of his fingers, and he will not be left in doubt any longer. Another mode of intensifying the sound of the voice is to hold the mouth-piece of a conically-shaped, flexible speaking-tube tightly against the larynx and the other end in the ear while the voiced elements are articulated.

Many of our pupils are apt to fall into the error of vocalizing sounds which should be non-vocal, and, *vice versâ*, they do not sound the voice in pronouncing elements that should be vocalized. For instance, they will say *hat-a* instead of *hat*, *cap-a* instead of *cap*, *book-a* instead of *book*, or *haf* instead of *have*, etc. Usually the pupil can be made aware of this mistake by being allowed to place the end of his finger on his teacher's throat where he can feel the vibrations of the voice when it is sounded. Sometimes, however, the trouble cannot be overcome in this way. In such cases the experiment of stopping up the ears, or that with the speaking-tube, may be successfully tried. These experiments have also been found useful in the attempt to soften a harsh voice. Quite a number of those who seem totally deaf show themselves sensitive to their own voices if they are made to

hear them by placing the mouth-piece of a speaking-tube on their own larynx and the other end into the ear, and often they learn in this way to speak more softly.

MUSCULAR SENSE IN THE VOCAL ORGANS.

Hearing persons who have not paid any special attention to the subject of vocal physiology perform the movements of articulation automatically, and generally they are not able to give a correct account of what is going on in their mouths or throats while they are speaking. You might, for instance, ask a dozen hearing persons what part the tongue plays while the sound of *s*, *l*, or *i*, etc., is uttered, and probably not one of them will be able to answer the question correctly. The sense of movement seems to be entirely lacking in their vocal organs. To develop this sensibility of the muscles of articulation is the first duty of one who wants to undertake the task of teaching deaf children to speak, because, in order to be able to correct faulty articulations, he frequently has to reproduce them himself and to find out, by means of this muscular sensibility, the character, force, etc., of the movements of the vocal organs from which these faulty articulations resulted. This muscular sense can be developed through practice only. The best mode of such practice is to study the principles of the pronunciation

of the different sounds of the alphabet, and to verify these rules by concentrating the attention on the action of the vocal organs during the utterance of each of these sounds. A student who has no access to the standard works on vocal physiology may gain sufficient knowledge for all practical purposes by studying the treatise on the principles of pronunciation, giving full description of the different sounds of the alphabet, which is to be found in the front part of Webster's Unabridged Dictionary. Take the description of the sound of *f*, for example, which reads as follows: "This letter is uttered by applying the lower lip to the upper front teeth, and emitting the breath." Now, sound this element and watch yourself while doing so, first by looking into a glass, and then without the glass. After some practice of this kind, the muscular sense of your vocal organs will become so well developed that you will be aware of the slightest movement of them without the assistance of the glass.

It is this muscular sense which, in the case of those of our pupils who have no speech when they come to us, guides the movements of their vocal apparatus while imitating the sounds of speech, and as they depend upon it entirely and use it continually, it becomes very acute in a very short time. For such pupils special exercises for the development of this muscular sense are not

necessary. But in the case of children who learned to speak before they became deaf, I consider it of the utmost importance that pains should be taken to educate the muscular sense of the vocal organs at the earliest practicable moment. For it has been my experience that the articulation of a pupil who became deaf at the age of six, eight, ten, or even twelve years of age, is more apt to deteriorate after he leaves school than that of a congenitally deaf child. I have often been shocked when, meeting one of these semi-mutes five or ten years after he had left school, I found that his speech, which was perfectly natural while he was in school, had so degenerated as to be difficult to be understood. Under favorable circumstances the articulation of congenitally deaf pupils improves after they leave school, but I do not recall one single instance of a semi-mute in whom a similar improvement was noticeable in after life. It seems to me that this can be explained in the following manner: The congenitally deaf articulator has his muscular sense to guide him in his speech. If those around him are painstaking, and remind him every time that he pronounces a word carelessly, he can correct himself by means of this muscular sense. But the semi-mute, who had a good command of language when he entered the institution, and therefore was not obliged to acquire many new words through lip-

reading, did not have this muscular sense developed. He speaks from memory only, remembering words as he used to hear them; his organs of speech move automatically, and the impulses from the nerve centres, which effect these movements, travel in old, well-worn ruts, as some scientists call it. As time goes by, his memory of spoken words begins to fade, his impressions of sounds become fainter from year to year, and the old paths which the motor impulses have been wont to follow, become disorganized; hence his articulation becomes indistinct, and if he finds that people do not understand him he is at a loss what to do. He has no way of correcting himself, because the muscular sense of his vocal organs, which is the only means by which he could control the action of these organs, has never been developed and is therefore entirely wanting. To guard against such deplorable degeneration of the articulation of semi-mutes, I have of late years taken pains to educate the muscular sense of their vocal organs by a system of exercises which is based on vocal physiology. The sounds of the letters of the alphabet are taken up separately, and the pupil is required to find out for himself, under the proper guidance of his teacher, what organs are employed in the formation of each particular sound, and what movements these organs have to perform in order to produce this sound. The sim-

ple element *f*, for instance, is taken up, and the pupil is asked what he is doing in uttering this element. If his explanations are not satisfactory, he is assisted by a series of questions, as: "Do you do anything with your tongue when you say *f*? Do you make any noise in your throat? What do you do with your lips when you say *f*? Is the lower lip pressed tightly against the upper teeth? Is the breath emitted from the mouth or through the nose? How does the breath escape from the mouth?" Questions of this kind teach the pupil to pay close attention to the action of his vocal organs, and thereby the muscular sense of these organs will be gradually developed. I have already seen very gratifying results from this experiment, but it has not been tried long enough yet to prove whether it will, in all cases, entirely prevent the degeneration of the speech of semi-mutes in after life, yet it seems to me that it must prove highly beneficial to this class of pupils.

WATCHING THE PRONUNCIATION OF PUPILS.

The teacher should train her ear so that she may be able to discover the slightest errors in the pronunciation of her pupils. A person with normal hearing may, in a short time, become accustomed to the peculiarities of the pronunciation of deaf children, and be able to understand what they say, even though they say it in an imperfect manner.

New teachers are apt to fall into the mistake of accepting such imperfect enunciation and being satisfied with it so long as they understand it. This should not be so. The teacher should not rest satisfied if she only understands what the pupil says. Her ear should be so trained as to enable her to critically examine every sound that he produces, be able to detect every one of his errors, and know how to correct it. This kind of training of the ear cannot be acquired in a day, nor in a week. It takes a long time to gain it, and there is no other way of gaining it except by conscientious, steady watchfulness. If the pupil mispronounces a certain sound, the teacher has to watch the movements of his mouth to see if she cannot discover by what faulty movement the imperfect sound was produced. But if it is one of those sounds that are formed far back in the mouth, she must try to reproduce it herself, and ascertain, by means of her muscular sense, by what movement of the vocal organs it was produced. After some practice her ear will tell her where the fault lies, and she will not have to reproduce to herself the imperfect sounds of her pupils. In this connection I wish to call attention to one or two circumstances that hinder the teacher from carefully watching the articulation of her pupils, and, therefore, have a bad effect on it. Deaf children are very apt to form the habit of repeating

aloud, word for word, every question put by the teacher. While she uses her own voice, she cannot, of course, critically listen to what the pupil says, and if he slights his words, he is likely to go uncorrected. Many a careless habit is formed in this way, and afterwards requires a good deal of time and labor to be eradicated. The pupil ought to be made to watch his teacher's lips silently. This is more in accordance with the natural way of hearing children, and will ultimately be better for his articulation. In some schools for the deaf the practice prevails of letting a class of pupils speak in concert. Such practice is, in my opinion, very detrimental to the articulation of the pupils. It is impossible for the teacher to properly watch the pronunciation of each member of the class when all are speaking at the same time, and if they articulate their words carelessly, which they are inclined to do when they know they are not watched, their errors will not be detected. It is absolutely necessary that the deaf beginner, for whom it is so difficult to control his vocal mechanism, shall learn to be constantly on his guard, lest he should mispronounce his words, and nothing but constant watchfulness on the part of his teacher will accomplish this result. For similar reasons it is also advisable not to allow the pupil to speak aloud while studying his lessons and committing them to memory. He should learn to read off

silently words and sentences that are before him in written or printed form, and say them over in his mind without moving his lips.

ENGLISH SOUNDS.

It is indispensably necessary for an articulation teacher to thoroughly understand the correct formation of each of the sounds which occur in the English language. The following is a concise description of these English elements of speech. As each of them is described, mention will be made at the same time of the most common faults into which deaf articulators are apt to fall in pronouncing this particular element, and of the best modes of correcting such faults.

VOWELS.

All vowels are vocalized sounds, as has already been stated in the chapter on the movements of the larynx. During their pronunciation the vocal chords are set into vibratory motions by the breath, thus producing voice. The usual way of making the pupil aware of this fact is to let him place his hand on the teacher's neck close to the chin, or on the chest, so

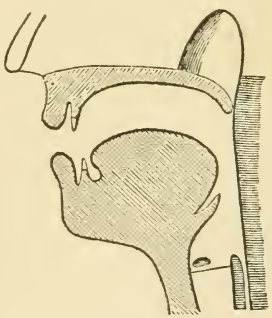

FIG. 5.
Position of the mouth for *ah*.

that he may feel the vibrations there, while she sounds the voice. Since deaf children easily fall into the habit of making too much effort in the throat while speaking, which gives the voice a harsh sound, it is sometimes better to let them feel the vibrations of the voice on the chest only, but not on the throat. They will then be more likely to give full chest tones.

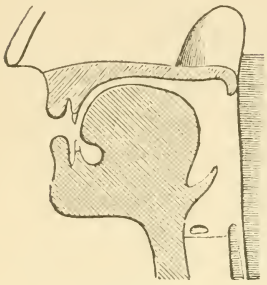

FIG. 6.
Position of the mouth for *e*.

All the English vowels require for their production that the mouth be kept open, that the soft palate be sufficiently raised, so as to shut off the nasal cavity from the mouth, and that an uninterrupted central channel be formed from the larynx to the lips, through which the voice may pass without meeting any obstruction.

Many of our little beginners commonly err against this rule, and obstruct this central channel by raising the back of the tongue and bringing it in contact with the soft palate, which hinders them from producing pure vowel sounds. This

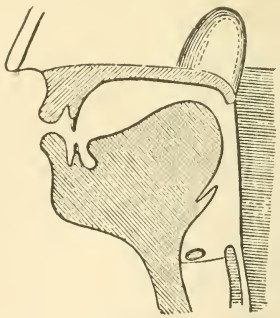

FIG. 7.
Position of the mouth for *oo*.

error may be corrected by pressing down the back part of the tongue with a common paper-folder.

The voice-producing vibrations of the vocal chords are the same for all vowels. Varities of vowels are produced by changes in the shape of the central channel through which the voice issues. These changes are effected by the lips and the tongue, as may be illustrated by means of the following scale of vowels.

e	*oo*
i (n)	*ore*
e (ll)	*aw*
a (n)	*o* (dd)
a (sk)	*u* (rge)

ah.

The Italian *ah*, as heard in *far*, *father*, etc., is one of the extremes of this vowel scale, the other extremes being *e* and *oo*. In the formation of the Italian *ah* the mouth and throat are opened widely and the tongue is left in its natural position of rest. (See Fig. 5.) If from the position for *ah*, the lips are gradually rounded while the voice is continued, we pass successively through all the sounds on the right-hand side of this scale; the vowel quality is modified from *ah* to *oo*. If from its natural, almost horizontal position for *ah*, the middle part of the tongue be slowly raised and the lips be spread, we

pass through all the vowels represented on the left-hand side of this series, and the effect of this gradual elevation of the tongue and spreading of the lips is the modification of the *ah* to *ee*. In the formation of *ee*, the middle part of the tongue is raised and closely approximated to the roof of the mouth, leaving only the smallest possible passage through which a vowel sound can be uttered. Any further contraction of this passage for the voice converts *ee* into the articulation *y*, as in *yes*. The most common mistake that the deaf articulator makes in pronouncing *ee*, is that he does not sufficiently raise the middle part of the tongue, the result of which is that the sound becomes too open. To correct this mistake we have to call his attention to the wrong position of his tongue by means of the hand-glass. The spreading of the lips helps to raise the tongue, and the action of the muscles which come into play during this process may be felt under the angles of the jaw. Hence, it is well to let the pupil place his hand there while he tries to give the *ee* sound. Some pupils raise the back part of the tongue instead of the middle part in pronouncing this element; the result is a nasal *ee*. The way to correct this mistake is to explain to the pupil how it is caused.

The sound of *ee*, which requires for its formation a movement of the middle part of the tongue, and the articulations *g* hard, *k*, and *ng*, in which,

as will be explained later on, the back part of the tongue comes into play, usually offer some difficulty, because the pupil cannot see the movements by which they are produced. If, as a last resort, the teacher will allow him to place his finger on her tongue while she pronounces these sounds, she will find this means of helping him to get a correct idea of the proper movements of this organ a good deal more effective than it may be agreeable to her.

If the tongue be a little depressed from its elevated position at *ee*, and the voice is sounded, we obtain the vowel *i*, as in *ill*, *it*, etc. Some think that this vowel may be produced by shortening the sound of *ee*, but that is not so, because each of these two sounds requires a different position of the tongue. A further depression of the tongue gives the sound of *e* heard in *end*, *bell*, etc.; a still further depression results in *a* in *an;* the effect of a still further depression is the sound of *a* in *ask*. Beginners are apt to mispronounce this class of vowels, either by raising the tongue too much or by not raising it enough. The corrections have to be made accordingly.

In forming the vowel *oo* the lips are rounded and the oval aperture is made so small that the least further contraction results in the articulation of *w* as in *we*, etc. When the lips are rounded, they must, of course, be protruded at the same

time; the tongue is drawn back in the mouth and its back part is raised. But as all this is the natural and inevitable result of the rounding of the lips, it is best to let well enough alone and not trouble the pupil by calling his attention to it. The lips slightly separated from their close position at *oo* produce the sound of *o* in *ore;* a further separation of the lips results in the sound of *aw;* a still further separation gives *o* in *odd;* and a still further separation has the effect of *u* in *urge.* In pronouncing this half of our vowel scale, the pupil generally makes the mistake of either opening his mouth too much or not opening it enough. But mistakes of this kind are the easiest to correct.

The sounds of long *a* and long *o* were omitted from our table of simple vowel elements, because, as Mr. A. Melville Bell puts it, "they are both diphthongally terminated with the closest vowel of their respective classes—*a* with *e* and *o* with *oo.*" The omission of this diphthongal termination, especially notable in the *a*, is a common peculiarity among deaf articulators; the consequence is that the *a* becomes too open, and such words as *lady* and *baby*, etc., sound like *lad-dy* and *bab-by.* To correct this defect, place the pupil's hand under the angle of your jaw, and, sounding *a*, emphasize this final vanish into *e* by prolonging it a little longer than is usually done.

The diphthong *i*, as in *hide*, etc., is formed by beginning with the *ah* and combining it in one utterance with all the vowels on the left-hand side of our table. The diphthong *ou* or *ow*, as in *out*, *owl*, etc., is produced by starting with the *ah* and passing through all the vowel sounds on the right-hand side of the scale till *oo* is reached. *Oi* is a continuation of *aw* and short *i*.

In dealing with the diphthongs *i* and *ou* it is sufficient to call the pupil's attention to the first and last elements of these combinations. For, while passing rapidly in one breath from *ah* to *oo*, or from *ah* to *ee*, the intermediate glides will naturally follow. According to the rule laid down by the authorities, the accent is always on the first vowel with which a diphthong begins. By pronouncing *ou* our pupils generally honor this rule more in the breach than in the observance. The reason is that the close vowel *oo*, into which this diphthong terminates, is more conspicuously visible to the eye than the open vowel *ah* with which it begins. To correct this error, the pupil must be taught to pronounce the first element of this combination with greater emphasis than the last.

CONSONANTS.

Whereas the vowel sounds require for their correct formation an open, uninterrupted passage from the glottis to the lips, in the pronunciation of the

consonants, the breath, or voice, has to be either wholly or partially obstructed or compressed as it passes through the throat and mouth. The first point at which the breath may be obstructed in its outward passage, and a consonant formed, is the back of the tongue. By contact between the back of the tongue and the palate the consonants *k*, *g* (hard), and *ng* are formed. The next point at which a consonant may be produced is the middle part of the tongue. The sounds produced at this place are *sh*, *zh* (the sound of *s* in *pleasure*), and *y* as in *you*. The sounds formed by contact or approximation of the fore part of the tongue and the front part of the palate are *t*, *d*, *n*, *s*, *z*, *r*, *th*, and *l*. By contact of the lips, *p*, *b*, *m*, *w*, and *wh* are produced; and by contact of the lower lip and the upper teeth, *f* and *v* are formed.

The consonants formed by the lips are the simplest, and, as they can be plainly seen, they are readily imitated by our pupils. Those consonants which are formed farther back in the mouth present greater difficulty. In describing each of this class of sounds separately, it therefore seems proper to take them up in the reverse order, but not in that in which they are mentioned in the preceding paragraph.

P.

In the formation of this sound the current of breath (unvocalized) is altogether stopped by con-

tact of the lips, and is then expelled with a slight puff when these organs separate. To teach *p*, let the pupil watch your lips and feel on the back of his hand the puff of air emitting from your mouth while sounding this element. Being one of the simplest articulations, it is not often mispronounced by the deaf pupil. If he says *cap-ah* instead of *cap*, show him in the usual way that he must not make any noise in his throat while, or after, articulating the *p* sound. If he puffs too vigorously, or too feebly, hold a thin slip of paper, or a feather, before your mouth while imitating his erroneous way, and call his attention to the movement of the light object before your mouth while saying *p* properly.

B.

This sound is the vocalized form of *p*. The position of the organs necessary for forming it is the same as for *p*, but the lips are held together with less force, and the vocalized breath is compressed within the larynx and the mouth. The vibration of the vocal chords and the distention of the larynx accompanying this sound may be felt on the neck. In *b*, the breath is expelled with less force than in *p*, which difference in the degree of force the pupil can be made to feel on the back of his hand. He often is inclined to say *mb* for *b*. To correct this error, let him place the end of his

finger on the side of your nose, and call his attention to the vibration which may be felt there when the faulty sound is given.

T.

In forming this sound the fore part of the tongue is brought into close contact with the upper gum; then the contact of these organs is forcibly broken, and the breath, unvocal, is emitted through the mouth. We let the pupil see the position of the tongue, and let him feel the emission of breath on the back of his hand. The errors which our pupils generally commit while articulating words which contain the letter *t* are similar to those which were mentioned in connection with the letter *p*.

The proper way of saying *t* is, as I have just mentioned, by bringing the fore part of the tongue into contact with the upper gum; but a good *t* may also be produced by putting the tongue between the teeth, or by pressing it against the inside of the lower teeth. The pupil can see best the position of the tongue if it is put between the teeth; hence the *t* formed in this way is most readily imitated by him, and it answers the purpose in the beginning. Later on, when he has acquired better control over his organs, the correction can easily be made.

D.

The configuration of the articulating organs is the same as for *t*, but for *d* "the breath confined within the mouth is vocalized and rendered audible in a sort of murmur heard before the organs separate." The difference between *d* and *t* is of exactly the same nature as that between *b* and *p*. Some pupils will say *nd* instead of *d*. This error is corrected in the same way as when *mb* is heard instead of *b*.

K.

In forming this element the back part of the tongue is raised and pressed against the palate, and then the two organs are audibly separated. Some deaf children require considerable practice before they are able to use the muscles of the back part of the tongue, as is necessary to give a good *k*. The most common fault is that the contact between the tongue and the palate is made too far forward, and the result is that we hear *t* instead of *k*. This fault is corrected by asking the pupil to say *t* while you press the fore part of his tongue downward and a little backward by means of a paper-folder. It often requires long, continued, and patient effort to correct this fault.

G HARD.

The sound of *g*, as in *go*, *give*, etc., is formed with the organs in the same position as for *k*, but they are pressed against each other more gently; and, while the contact lasts, an effort is made to compress the intonated breath within the larynx. The pupil can feel this process if you let him place his hand on your neck while pronouncing "hard" *g*. You can develop this sound from *d* in the same way as *k* may be developed from *t*.

F.

This sound is uttered by applying the middle of the lower lip to the upper front teeth and emitting the breath—unvocalized—through the corners of the mouth. The arrangement of the organs concerned in the utterance of this sound is so plainly visible, and the emission of the breath can be so plainly felt by holding the hand close before the mouth, that hardly any deaf child fails to give a correct *f*.

V.

"This sound differs from that of *f* only in being an utterance of the voice instead of the breath, the organs assuming precisely the same position for both sounds." In sounding *v* some pupils are inclined to emit the vocalized breath through the

nose instead of sending it through the mouth. This fault may be corrected by holding the nose shut between the thumb and forefinger, thus forcing the voice to pass out through the mouth.

W.

The position of the mouth for *w* is nearly resembling that for *oo*, but *w* "requires for its utterance a greater contraction of the labial aperture, and this compression of the lips changes the quality of the sound, giving it a buzzing and articulative instead of a smooth and purely vocal character." The pupil cannot only see, but most distinctly feel, the difference between these two sounds by holding his hand under the teacher's chin while she utters them. When *w* is before *oo*, as in *wood*, *wool*, etc., the combination is rather difficult, and the pupil is apt to omit the *w*, so that *wood* becomes *ood*, and *wool* becomes *ool*. To correct this error, call his attention to the slight separation of the lips which is necessary in order to pass from *w* to *oo*, and emphasize the *oo* somewhat.

H.

This sound "is an emission of unvocalized breath, through whatever position of the mouth-organs is required by the succeeding element, the organs being always placed to form the next following letter before the *h* is pronounced. Thus,

in *he*, the tongue is put in a position to sound the *e* before the *h* is uttered; and similarly in *hall*, *hard*, *home*, etc." If a pupil fails to sound his *h's*, let him feel on the back of his hand the breathing which forms this element. Or, require him to give the sound of *f* while the paper-folder is inserted between his teeth in such a manner as to keep his mouth wide open.

H is the Cinderella of the alphabet. Writers generally refuse to give it a place among the vowels or among the consonants, and consign it to some solitary corner in their books. I have taken it up at this point of my list because it forms a part of the element which is next in order.

WH.

"The true sound of these letters is in the reverse order, viz., *hw*; *e.g.*, *what* is pronounced *hwat*." It is the aspiration *h* uttered through the position taken by the lips in the formation of *w* and "a slight degree of vocality added to the action."

S.

In the formation of the sound of *s*, as in *same*, *yes*, *massy*, etc., the fore part of the tongue must be expanded and brought in contact with the upper gum in such a manner that only a very small opening is left in the centre, through which opening the breath—unvocalized—is emitted. The position

of the teeth is also of importance—their edges must be brought into very close approximation, but without touching. Attention must be paid to the lips too. They have to be open for *s*, so that both rows of teeth are visible. If a child's teeth stand far apart, so that there are open spaces between them, which prevent the breath from being sufficiently contracted while the *s* sound is given, such a child has to be taught to fill out the open spaces between his teeth with his tongue. A sound very closely resembling the *s* can be produced by pressing the tip of the tongue against the inside of the lower teeth. This sound, which only few persons can distinguish from the correct *s* sound, will do well enough for a deaf child that finds it too difficult to produce the *s* proper.

Z.

The sound of this letter, as heard in *zone*, *maze*, *hazy*, etc., "is the vocal or sonant form of *s*." To obtain it, require the pupil to give *s* and add voice, which he can feel on his larynx.

TH.

Th has two sounds; the first, as in *thick*, is generally called hard; the second, heard in *that*, is classed as a soft consonant. *Th* hard is equivalent to the sound made in lisping. The simplest way of teaching it is to let the pupil attempt to sound

s, with the tip of the tongue placed between his teeth. After he has learned to give the *th* with the tongue in the position indicated, then he can easily learn to produce this element with the point of the tongue applied to the back of the upper front teeth, which is the more correct configuration for *th*.

Th soft is obtained by adding voice to the formation of the preceding sound.

SH.

In the formation of this element the fore part of the tongue is expanded, raised, and slightly drawn backward. The unvocal breath is emitted over the front edge of the tongue, and the teeth are held slightly apart. The position of the tongue "cannot be observed during the articulation of this element, for the teeth are not sufficiently apart, but if the mouth be opened after *sh*, without moving the tongue from the articulative position, its proper elevation will be evident."

Sh may be obtained by requiring the student to pronounce the *s* sound, and then, "while the current of breath flows uninterruptedly, letting him gradually draw back the tongue, keeping its point at a uniform elevation." The process may be helped by protruding the lips at the same time. Another way of assisting the pupil in giving this sound is to insert a thin paper-cutter crosswise

between his teeth; require him to rest his tongue on it while he holds this organ broad and loose, and then push it back gently while he emits his breath over it.

ZH.

"This sound is the vocal correspondent of *sh*, and is uttered with the organs in precisely the same position." The combination *zh* never occurs in the proper orthography of any English word; the two letters written together are, however, almost uniformly used in works on pronunciation, to indicate the sound which the *s* represents in *leisure*, the *z* in *glazier*, etc. It is of special importance for us, because from it is obtained, as will be presently shown, another, and for deaf-mutes a rather difficult sound, namely, the *j*.

CH.

"The compound sound signified by this digraph is not precisely equivalent to that represented by *tsh*. The ordinary sound of *t* is uttered with the tip of the tongue pressed against the gum of the upper front teeth. The first element of *ch* is uttered with the upper flat surface of the tongue, near the tip, applied to the gum at a point higher up, just where a relaxation of the contact produces the configuration requisite for sounding *sh*, the second constituent of the compound. The two

lements are so closely blended in pronunciation that, like a diphthong, or compound vowel, they have the effect of only a single sound, or beat, upon the ear." The pupil will never learn to give *ch* perfectly if we teach him to pronounce these two letters like *t sh;* there will always be a middle sound heard between the *t* and the *sh*, which middle sound is formed, involuntarily, through the action of the tongue while withdrawing from the forward position in *t* to that for *sh*. It is best to treat *ch* as a single element, but not as a compound sound. Let the pupil place the front edge of his tongue into the position for *sh*, raise it from that position so that it touches the roof of the mouth, and then expel the breath suddenly and forcibly.

J.

The sound of *j*, as in *jar*, *joke*, etc., or of *g* soft, as in *gem*, *engine*, etc., "though almost identical with that of *dzh*, differs from it as the sound of *ch* in *chin* differs from that of *tsh*. *J*, or *g* soft, is, therefore, the vocalized form of *ch*. The configuration of the articulating organs is the same as in *ch*, but the attention of the deaf child has to be called to the vocalized quality of the *j* sound.

L.

The sound of this letter "consists of an efflux of vocalized breath, or voice, over the sides of the

tongue," while its expanded fore part is held loosely against the gums of the upper front teeth. *L* is generally called a divided articulation, because the vocalized breath is divided into two streams, which pass out over the sides of the tongue, setting its edges into vibratory motions. Sometimes the formation of the *l* is faulty, because the pupil points his tongue too thickly and makes it rigid, instead of spreading it out well in front and holding it loosely, so that its edges cannot vibrate. And sometimes the *l* sounds nasal, because the edges of the tongue touch the roof of the mouth all around, instead of an opening being left on each side, and in that way the vocalized breath is prevented from escaping through the mouth and is forced to pass out through the nose. These faults can easily be explained to the pupil.

R.

In forming the sound of *r*, the front part of the tongue is turned upward so that it assumes the shape of the bowl of a spoon, and the voice is suffered to flow freely over its front edge, which must be held loosely. To teach this sound, pronounce it clearly and distinctly with your mouth wide open, to show the position of the tongue, and let the pupil feel the vibrations of the voice on your neck close to the chin.

A not uncommon fault is that *l* is sounded

instead of *r*. The cause is that the tip of the tongue is brought in contact with the gum. This defect is remedied by showing that a small passage for the voice must be left between the point of the tongue and the roof of the mouth.

Another and quite frequent fault is caused by throwing the articulation forward to the lips, so that the effect of *w* is produced, instead of *r*. In this case the pupil has to be told not to bring his lips into play when he intends to give the *r* sound.

The ear notices a marked difference between *r* when final and *r* initial. But the position of the tongue has to be the same in both cases, and the difference in the acoustic effect is but the natural result of the coalescence of the *r* with the vowel that precedes or follows it. Hence it is unnecessary to inform the pupil that this difference exists, and we may do more harm than good if we require the pupil to make a special effort to give one sound for *r* when it stands at the beginning of a syllable, and another sound when it forms the end of a syllable.

Y.

"This sound, which is heard at the beginning only of a word or a syllable, is formed from the vowel *e* by a closer approximation of the tongue to the roof of the mouth." The difference between *y* and *e* is precisely the same as that between *w* and *oo*. The stronger vibration in *y*—the result

of the compression of the vocal current through a more contracted aperture than in *e*—can be plainly felt under the chin while the two sounds are uttered successively. Thus *y* may be obtained from *e*. There is, however, another mode of obtaining it, viz., to let the pupil attempt to sound *z* while the fore part of his tongue is held down and pushed a little backward by means of a paper-cutter. This latter mode of developing the *y* may be resorted to if the pupil experiences difficulty in pronouncing *y* followed by the sound of *e*, as in *year*, *yield*, etc.

M.

This sound "is produced by closing the lips and letting the voice issue through the nose." The vibrations of the voice may be felt under the chin or on the side of the nose. The position of the mouth for *m* being the same as for *b* or *p*, some pupils will say *mbah* or *mpah* for *mah*. To correct this error I take the child's hand between my thumb and forefinger, touching it very gently, to imitate the light contact of the lips in *m;* then I press it harder and explain that this is the way in which the lips are pressed together in *b* or *p*.

N.

In the production of this sound the edges of the tongue touch the roof of the mouth all around, so

as to close up the mouth passage completely, and the voice is sent through the nose. Let the pupil see the position of your tongue in forming this element, and let him place the end of his forefinger on the side of your nose, so that he may feel the vibrations caused there by the voice as it passes out through the nostrils. A common error is that the pupil's tongue does not touch the roof of the mouth all around, leaving an opening on one or both sides through which the voice escapes, and the character of the sound is altered. This can easily be shown to the pupil.

NG.

This sound, as heard in *sing*, *singer*, *singly*, etc., "is a simple, elementary sound, and is not (as might be supposed) a compound sound made up of the sound of *n* in conjunction with that of *g*. In forming *ng* the tongue is placed in the same position as for forming *g*," and the voice passes out through the nose as in *n*.

Ng may be obtained by requiring the pupil to give the sound of *n*, while his tongue is held down and pushed backward by means of a paper-folder. If we wish to develop the *ng* sound in this way, the pupil must first have learned to give a good clear *n*. Combinations in which *ng* is preceded by a close vowel, as in *evening*, *seeing*, *crying*, etc., are very difficult to pronounce for a beginner in artic

ulation. He generally fails to open or shut the nasal passage at the right time, so that either the *ng* is not sufficiently nasalized, or the whole word is spoken through the nose. It therefore seems indicated to select for the first practice such combinations in which *ng* stands after an open vowel, as, for example, *long*, *hang*, *thank*, *monkey*, *tongue*, *handkerchief*, etc.

This closes the list of all the simple, elementary sounds. The letters of the alphabet which are omitted in this series, namely, *x* and *qu*, are compound sounds, the former being equivalent to *ks*, or sometimes to *gz*, the latter to *kw*.

CONSONANT COMBINATIONS.

Syllables or words in which each consonant is separated from the next by a vowel are pronounced by our pupils with greater ease and nearer approach to correctness than those in which two or more consonants follow each other without being separated by a vowel. It is a common occurrence that a little deaf child will say *b^{a}lue* instead of *blue*, *s^{a}now* for *snow*, *an^{a}d* for *and*, *as^{a}ks* for *asks*. This intermediate sound, or glide, as it is technically called, is heard if the articulating organs, instead of passing directly from the position of one consonant to that of another, drop into their natural position of rest after one element is completed, and then assume the configuration of the succeeding element,

the issue of the breath or voice, as the case may be, being continued in the meantime. Let me illustrate this. In the pronunciation of the word *bottle*, for instance, the point of the tongue has to remain in contact with the upper gums after the *t* sound is completed, and its side-edges have to be disengaged from the roof of the mouth to allow the voice to escape in the enunciation of *l*. Instead of doing this, our pupils are very apt to let the tongue drop down to its normal position on the floor of the mouth after they have finished the *t*, then raise it for *l*, and allow the expiratory current of breath to flow in the interval; the result is that we hear them say *bott^{a}l*.

There are certain rules which govern the pronunciation of consonant combinations, and which, if properly understood, afford great assistance in teaching deaf children how to articulate such combinations with correctness. For the sake of convenience all the numerous consonant combinations that occur in the English language may be divided into three classes:

I. Combinations, the elements of which are formed at the same place in the vocal tract. To this class belong all words in which a consonant is doubled, *e. g.*, *hammer*, *cannon*, *better*, *acquire*, etc.; also *mp*, *mb*, in which both elements that are combined are formed on the lips; *nd*, *nt*, *dl*, *tl*, in which both are formed with the point of the tongue in

the same position; *ngk*, both of which are the result of one and the same movement of the back part of the tongue.

II. Combinations that are composed of consonants whose points of articulation lie near each other in the mouth, as *bl*, *pl*, in which the first sound is formed by the lips and the second by the front part of the tongue; *sl*, *st*, *ns*, *dr*, *tr*, *tsh*, in each of which the tip of the tongue has to be placed successively at two points that are near to each other.

III. Combinations whose elements are produced at points that are distant from each other. To this class belong *kw*, as heard in *queer*, *kl*, *sk*, *kt*, *gd*.

The rule for the pronunciation of combinations of the first class is to *hold the position for the first element till the second element is finished.* In saying *cannon*, for instance, we sound the letter *n* twice, but when the final *n* of the first syllable has been uttered, the tongue must be *held* in the position in which it is at that moment, so as to be ready for the initial *n* of the second syllable. In the word *hammer*, the letter *m* must be sounded twice, but when the first *m* is finished, the lips must not be separated—they must remain closed till the second *m* is completed. In words like *lamp*, *lumber*, the lips have to be *held* closed till the *p* or *b* is completed. In *anger*, *longer*, *younger*, in which *g* hard follows the *ng*, the back of the tongue must not be separated from the palate, but must remain in close

contact with it till the *g* hard has been sounded. It is not difficult to explain all this to our pupils, but they have to acquire some practice before they are able to do as we want them to.

In order to articulate a combination of the second class correctly, *the position for the second element has to be assumed either before or while the first element is pronounced.* In *blue*, *play*, etc., the *l* position of the tongue has to be assumed before the lips are separated. It has already been explained that if the pupil opens his lips after *b* or *p*, while his tongue is still in its natural position of rest, and he raises it then to bring it into the position for *l*, the result is *b^{a}lue* or *p^{a}lay*. The best illustration of this rule is the sound of *ch*, as in *chair*, *church*. This sound is a combination of *t* and *sh*. But if the *t* is uttered with the tip of the tongue in the ordinary forward position for the *t* sound, the result is *t^{a}sh*. The tip of the tongue has to be "applied to the gum at a point higher up, just where a relaxation of the contact produces the configuration requisite for sounding *sh*."

In regard to combinations of the third class, we have to be governed by the rule, *Hold the position of the first element till that of the second element has been assumed.* Thus, in *queer*, the back of the tongue must not be relaxed from the *k* position till the lips have been adjusted for *w*; or, in *act*, the *k* contact must not be loosened till the tip of

the tongue has been brought into position for *t;* or, in *sky*, the teeth must not be separated, and the point of the tongue must not be removed from the *s* position, till the back of the tongue has been raised for the *k* sound.

In order to pronounce *spr* in one utterance, as in spring, the *s* must be combined with the *p* according to Rule II., and the *p* must be joined to the *r* in accordance with the same rule. In *square*, we must observe Rule III. in joining the *s* to *k*, and the same rule in combining *k* with *w*. In *twelfths*, we join *l* to *f*, *f* to *th*, and *th* to *s*, all according to Rule II.

BREATHING.

Quite often the articulation of deaf pupils is defective, because they do not properly manage the breath. In order to be able to remedy such defects the teacher must thoroughly understand the process of breathing. Hence, it seems proper to discuss the subject here, at considerable length.

The first thing requisite for the production of sound and speech is a current of air passing through our vocal apparatus. This current of air is furnished by the process of breathing. In the wise economy of nature, the atmospheric air, which we inhale for vital purposes, is used, as it passes out of our lungs, for the formation of sound and speech. "Breath is the material of speech," as Prof. A.

Melville Bell puts it in his "Principles of Speech and Vocal Physiology," and it may be added that breath is also the motive power of that most important part of our vocal machinery which produces voice, namely, the vocal chords. Hence without breath speech is impossible, and, without correct and normal breathing, correct and normal speech is impossible. It is therefore evident, that, in order to thoroughly understand how we speak, we must go to the root of the matter and study the mechanism of breathing.

It is said that Professor Dalton, lecturer on physiology at the College of Physicians and Surgeons, in New York city, sometimes begins his lectures on respiration by asking his students what the most important organ of breathing is, and very seldom does he get the right answer. The organ which is prominent above all others in the active movements that appertain to the important function of respiration is the diaphragm. Professor Dalton says in his work on human physiology: "In the ordinary quiescent condition, the diaphragm performs most of the work in the act of inspiration." Prof. George Von Meyer, of the University of Zurich, Switzerland, who is also a high authority on the subject, goes so far as to say, in his work on "The Organs of Speech," that "ordinary, quiet inspiration is effected by the activity of the diaphragm alone." He evidently thinks

that the part which some other organs play in this process is so unimportant that it need not be considered at all.

The diaphragm, or midriff as it is frequently called, is a thin plate composed of muscles and fibrous tendon, and forms the partition-wall separating the thoracic, or chest cavity, from the abdominal cavit.. Its edges are attached to the lower circumference of the cavity of the chest. It, therefore, forms the floor of the thorax and the roof of the abdomen. The two cavities are completely separated from each other by the diaphragm, which has only a few openings for transmitting the œsophagus, and some blood vessels. The connections of the margins of these openings to the organs that pass through them are air-tight. In order to understand the process of respiration we must bear in mind this fact which has just been mentioned, namely that the diaphragm forms an air-tight partition between the chest and

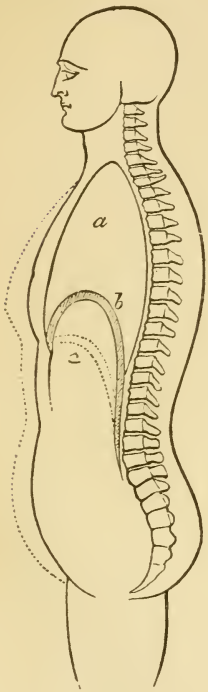

FIG. 8.

a, cavity of the chest; *b*, position of diaphragm in its relaxed state; *c*, diaphragm when contracted. The dark outlines show the figure of the chest when collapsed; the dotted lines show the same when expanded.

the abdomen. It is also important to note that the diaphragm has the shape of a dome, with its convexity directed upwards into the thorax or chest, while into its concavity, which is directed downward, various of the abdominal organs are projected.

The movements of the diaphragm are so intimately connected with those of the lungs, that before attempting to explain the action of the diaphragm I must call attention to a few facts regarding the lungs. The cavities of the lungs containing the air which we breathe are formed by numerous divisions and subdivisions of the trachea or air-tube, which become smaller and smaller, and at last terminate in little air-cells, varying from one-seventieth to one two-hundredth of an inch in diameter. It is important for our purposes to bear in mind, 1st, that the substance of the lungs is of a light, porous, spongy texture, and, above all, that it is highly elastic; 2d, that the entire air-passages are formed of stiff walls, so that the air always has free access to them, the trachea consisting of cartilaginous rings; and the bronchial tubes, even their smallest ramifications, having thin plates of cartilage scattered along their sides, so as to be always kept open; 3d, that the air-passages are lined throughout with exceedingly elastic fibres which extend longitudinally through the bronchial tubes, and completely surround the air-cells. The

elastic tissue, to which these fibres belong, may be compared best with india-rubber, because it can be considerably stretched, and when the force that stretches it ceases to act, it assumes its former size and shape.

Being placed in the cavity of the chest, the lungs have room to extend in all directions, when they become inflated with air and stretched to the point at which they are ready for elastic counteraction.

Now we are prepared to consider the action of respiration. During ordinary quiet breathing, the movement of inspiration is effected by contraction of the diaphragm. When the diaphragm contracts, it becomes flatter and descends towards the abdomen, thereby enlarging the cavity of the chest from above downward. At the same time a slight movement of the ribs and the sternum enlarges the chest in every other direction. The lungs being highly elastic, they expand and fill the enlarged cavity of the chest. In consequence of this expansion of the lungs, the atmospheric air rushes into them through the windpipe. In children and in the adult male, in the ordinary quiescent condition of which I am speaking at present, the diaphragm performs most of the work in the act of inspiration; the movements of the abdomen are, therefore, especially marked, and the expansion of the chest is barely noticeable. In the adult female the movements of the chest are generally more promi-

nent than those caused by the action of the diaphragm. This difference in the mechanism of respiration is probably, to a great extent, the result of the almost universal custom of tight lacing.

To understand the process of expiration, it must be remembered that the flattening of the diaphragm, besides enlarging the cavity of the chest, pushes down the abdominal viscera and presses it against the walls of the abdomen. This pressure forces the walls of the abdomen outward, and they become thereby extended. Thus the result of the contraction of the diaphragm is, that after the movement of inspiration is accomplished, the lungs are expanded and the walls of the abdomen are also expanded. The moment the contraction of the diaphragm ceases, it begins to ascend and assume its normal convex shape, whereby the cavity of the abdomen is enlarged and that of the chest becomes smaller. In consequence of this, the atmospheric air presses the abdominal walls against the intestines, and causes these to push the diaphragm upwards. The elastic reaction of the expanded tissue of the lungs is also called into play at this moment. By this elastic force the lungs are contracted to the dimensions which they possessed before the inspiration; and, while they contract, a portion of the air contained in them is expelled through the air passages. The process is aided by the fact that the abdominal viscera, which have

been pushed down by the descent of the diaphragm, are forced backward by the elastic reaction of the abdominal walls, and the depression of these walls is still further increased by a slight voluntary contraction of the muscles with which they are provided.

It has just been mentioned that only a portion of the air contained in the lungs is expelled during the act of expiration. The reason why the lungs are never completely emptied of all the air which they contain, and never can be, is, that within the lungs the bronchial tubes are circular, not flattened, and the walls of all the air passages are stiffened throughout their entire length by a cartilaginous layer which prevents their being ever completely closed, and, as they are always open, the air must remain in them. Dr. Kitchen, in his able treatise on the diaphragm, says: "The capacity of the adult male lungs, as an air-reservoir, is about three hundred cubic inches. In the utmost state of collapse" (meaning, of course, when the lungs have been removed from the chest), "they still hold about fifty cubic inches of air."

In the living subject, the quantity of air contained in the lungs can never be reduced to such an extent, even after the most powerful respiration. According to Professor Dalton, "only a comparatively small portion of the air in the lungs passes in and out with each respiratory movement,

and it will require several successive respirations before it can be entirely changed. The proportion existing between the air which is changed at each respiration, and the entire quantity contained in the chest, varies considerably with the different conditions of the respiratory function; but the average results obtained by different observers show that, in general, the volume of the inspired and expired air is from ten to thirteen per cent. of that contained in the whole pulmonary cavity. Thus it will require from eight to ten respirations to renovate completely the air in the lungs."

The number of respirations per minute must, of course, correspond to the number of contractions of the diaphragm in an equal period of time. "According to the results obtained from the most extensive and varied observations, the movements of respiration are performed, on the average, with a rapidity of 20 inspirations per minute. This rate varies considerably under the influence of different conditions, one of the most important of which is age. It is well known that respiration, as a rule, is more rapid in young children than in the adult, and it has been found, as the average of a large number of observations, that in the newly-born infant the rate is 44 per minute, and at the age of five years 26 per minute, becoming reduced to the standard rapidity of 20 per minute between the ages of fifteen and twenty years. Even in the

adult a condition of rest or activity readily influences the number of respirations; they are less frequent during sleep than in the waking condition. Even a difference in position has been found to have a perceptible effect, the number of respirations being in the same individual 19 per minute while lying down, and 22 per minute when standing up. Any special muscular activity, as the rapid motion of walking or running, at once increases the frequency of respiration, which returns to its ordinary regularity soon after the exertion has ceased."

From the explanation which has been given of the act of breathing, it is evident that while the movement of inspiration is an active one, accomplished by muscular contraction, that of expiration is a passive one, resulting from the elastic reaction of the lungs and the pressure of the atmospheric air, which force back into their natural positions the organs that have been displaced during the act of inspiration. For this reason the outgoing current of air passing through the throat and mouth during the act of expiration is best adapted and almost exclusively used for purposes of speech. Inspirations require muscular effort, and can only with difficulty be prolonged; whereas, the exhalations as ordinarily effected call no muscles into play, and only have to be regulated to furnish a continuous current of air, such as is required for the production of sound.

FORCED RESPIRATION.

It seems that while we speak in an ordinary, natural tone of voice, the movements of respiration are performed in a manner which is so much like normal quiet breathing for vital purposes that the difference is barely appreciable. But when we speak in a loud voice, above the ordinary tone, or when long sentences are pronounced with rapidity, a more considerable emptying of the quantity of air in the lungs must take place, and the inspirations have to be deeper and fuller. The alternate contraction and relaxation of the diaphragm is not sufficient to produce these results; the process has therefore to be aided by certain movements of the ribs. In order to explain how this is accomplished, the arrangement of the ribs has to be described.

"The ribs are elastic arches of bone, twelve in number, on each side. The first seven are connected behind with the spine, and in front with the sternum; they are called true ribs. The remaining five are false ribs; of these the first three are connected behind with the spine, and in front with the costal cartilages; the last two are connected with the vertebræ only, being free at their anterior extremities."

All the ribs articulate behind by movable joints with the vertebral column, and are so arranged

that in a position of rest their convexities look obliquely outward and downward. When the occasion for a deep and powerful inspiration arises, the ribs and the sternum are drawn upward by the contraction of the scaleni and intercostal mus-

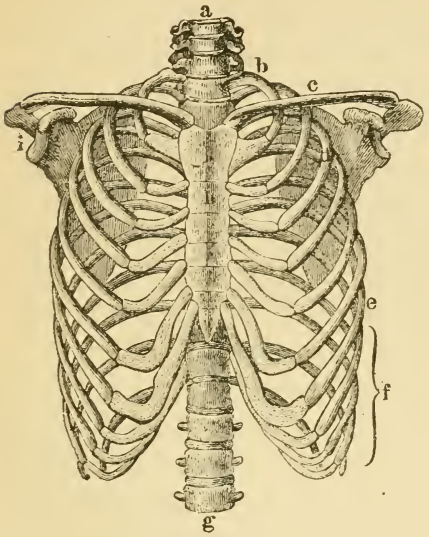

FIG. 9.

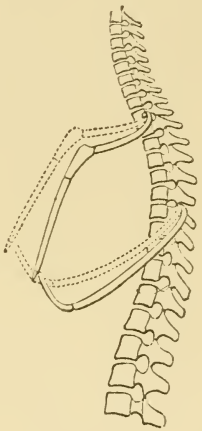

FIG. 10.

Front view of the thoracic cavity; *ag*, vertebral column; *h*, sternum; *bde*, the seven true ribs; *f*, the five false ribs; *c*, collar-bone; *i*, shoulder-blade.

cles, and as each rib rotates upon its articulations with the spinal column at one extremity and with the sternum at the other, its convexity is necessarily carried outward, and the cavity of the chest is expanded laterally; at the same time the movement of the sternum enlarges, to some extent,

the antero-posterior diameter of the thorax, so that the latter is expanded in every direction, and a stronger current of air passes into the lungs. During a forced expiration the ribs are drawn down by the costal and abdominal muscles, and they thus serve to compress the sides of the chest. In cases of excessive want of breath, as, for instance, after rapid running, the muscles which pass from the thorax to the upper extremities are also called into play in elevating the ribs, and the collar-bones and shoulders are raised at the same time.

From the description which I have given of the mechanism of breathing, it may be seen that there are three methods of carrying on the process of respiration, namely :

I. *Diaphragmatic breathing*, which is so designated because most of the work in this act is performed by the diaphragm. It is sometimes called abdominal breathing, because it is indicated by the protrusion of the abdomen, caused by the descent of the diaphragm. Diaphragmatic or abdominal breathing is constantly seen in children, as well as in the adult male, in the ordinary quiet, tranquil condition, as in peaceful sleep.

II. *Costal* or *rib breathing*, sometimes called thoracic breathing, in which the ribs are brought into play, and the expansion of the chest is especially marked. This mode of breathing is habitual in the female, and is a characteristic mark of the

female sex. As has already been said before, it is probably the result of tight lacing.

III. *Clavicular* or *collar-bone breathing*, which is performed by raising the shoulders with the collar-bones and the upper part of the chest.

According to the best authorities on the subject, diaphragmatic breathing during ordinary speech, and the combined methods of diaphragmatic and costal breathing during loud and rapid talking, constitute the right way; but clavicular breathing is totally wrong and vicious, and should not, in a state of health, be made use of under any circumstances for the production of voice.

Dr. Lennox Browne, of London, England, in his excellent work on "Voice, Song, and Speech," adduces the following reasons for the correctness of this rule. "When enlarging our chests by the descent of the midriff, and by sideways extension of the ribs, we inflate the lungs where they are largest, and where, consequently, we can get the largest amount of air into them. When expanding our chests by raising the shoulders and collar-bones, etc., we inflate the lungs where they are smallest, and where, consequently, we get the smallest amount of air into them. . . . This may be easily demonstrated by means of the spirometer, an instrument which accurately tests the breathing power of man by indicating on a little dial the exact number of cubic inches of air blown

into it. . . . There is still more powerful reason why midriff and rib breathing should always be made use of, and why collar-bone breathing should never be resorted to. The lungs at their bases are surrounded by soft and yielding parts. We can contract and relax the midriff to the greatest possible extent, and for any length of time; that will never fatigue us, because nature has not placed any obstacle in our way. . . . Again, we can expand and contract our lower ribs to the greatest possible extent, and for any length of time, without incurring any fatigue, because here, also, nature has not placed any obstable in our way. . . . At the top of the lungs the very opposite is the case. The ribs are here not nearly so free as at the base, and they are much shorter. They are attached, not only to the spine, as are the lower ribs, but also to the breast-bone in front. . . . They are also greatly impeded in their movements by the shoulder-blades and collar-bones, which carry the arms; and all this weight has to be lifted if inspiration be commenced in that region."

Now I have to turn rather abruptly to another point. Inspiration, as well as expiration, can be effected either through the nostrils or through the mouth. However, respiration through the mouth is only resorted to in case of want of breath, or when a deep respiration is taken, or, again, as the

result of bad habit. In ordinary quiet respiration the mouth is generally closed, and the cavity of the mouth is not employed as an air-passage. The air employed in respiration enters by the nostrils, passes through the nasal cavity into the upper part of the pharynx, then through an orifice in the anterior wall of the pharynx immediately below the cavity of the mouth into the larynx, which marks the commencement of the windpipe, and finally through the windpipe into the lungs. (See Fig. 1, p. 37.) In passing out, the air follows exactly the same track, but, of course, in an opposite direction. The pharynx is always open. From the manner in which its walls are attached to the bones of the skull, and to the hyoid bone, they are held so tense that they cannot collapse, and, therefore, form an open cavity. Thus an uninterrupted passage is secured to the air from the nasal cavity through the pharynx into the larynx, and thence through the windpipe into the lungs. In regard to mouth breathing, Dr. Lennox Browne says: "It is a pernicious and dangerous practice, which frequently leads to diseases of the respiratory and of the vocal organs, and which ought to be discarded as much as possible." Dr. Kitchen, of New York, in his treatise on the diaphragm, in speaking on this subject mentions the well-known fact that if we breathe through the mouth "the air reaches the throat in too cool and dry a state, and

overloaded with dust and other impurities that would otherwise be deposited on the sinuous surfaces of the nasal cavities, and on the tongue and roof of the mouth." He adds that "breathing through the mouth leads not only to irritation of the throat, but the nasal passages, missing the normal amount of stimulus from the rush of air through them, are apt to lose tone, and the mucous membrane becomes relaxed and falls into a state of passive catarrh, and is too easily affected by inflammatory attacks."

It has been remarked at the beginning of this chapter, that without correct and normal breathing, correct and normal speech is impossible. It therefore seems proper to devote a few words to the subject of incorrect and abnormal breathing, and to those disturbances of the respiratory mechanism, which either destroy perfect speech or render the exercise of it impossible for the time. I cannot, of course, allude to disturbances which owe their existence to disease, but can only mention those which appear as passing disturbances of an otherwise perfect respiratory mechanism, and must be referred to unusual or abnormal excitation of the nerves which govern the movements of the muscles of the respiratory apparatus. The disturbances in question naturally fall into two divisions. In one of these divisions, *inspiration* assumes an unusual form, and in the other, *expira-*

tion deviates from the common method. As disturbances of the normal form of inspiration, we have the phenomena which are known as hiccough, yawning, and stammering. The altered forms of expiration which belong to our subject are: sneezing, coughing, laughing, and sighing. A full description of all these abnormal modes of respiration might be interesting, but it lies beyond the scope of this treatise. I will, therefore, limit myself to a short discussion of stammering, as far as it is connected with a defect in speech. This defect in speech is probably never met with in congenitally deaf persons who have been taught to use their voices, but it may occur among deaf articulators who lost their hearing after they had acquired speech in the natural way; hence it is proper to discuss it here. Until about one year ago I had a pupil in my school who stammered badly when he first came to me. I shall say more about him by and by. The root of stammering lies in spasmodic contraction of the diaphragm, which may last several seconds, and, as long as it continues, prevents expiration. As, however, the production of speech depends upon the expiratory current of air passing through our vocal organs, it is impossible for the person suffering from such a spasm to produce any sound until the spasm is over. This ineffectual, and therefore exaggerated, effort to produce sound, gives rise to distressed

grimaces, and this distressed expression must necessarily be augmented by the fact that, by so delaying expiration, a want of breath is felt and the circulation of the blood interrupted. Dr. Albert Gutzman, first assistant at the municipal deaf-mute school of Berlin, Germany, who has made the cure of stammering a specialty, and who has published a very interesting volume on the subject, expresses the opinion that, in persons of ordinary intelligence, stammering is merely the result of bad habit, and as proof of this assertion, he cites the fact that the congenitally deaf, or those who lost their hearing in infancy and are taught to articulate by the usual methods, never fall into the fault of stammering. "A child," he says, "very easily forms faulty habits of any physical movements, and so also of speech. A deaf child learning to speak, never stammers, because it acquires speech under the constant care of the teacher; whereas, in the case of the hearing child, the development of speech goes on without any guidance whatever."

Now then, if stammering is the result of faulty respiration, it must be clear that the only efficient way of treating it is by regulating the breathing. To accomplish this, the patient is required to take a noiseless, unhurried, deep inspiration, chiefly performed by the diaphragm and the walls of the chest, before he attempts to speak, and to let this

inspiration be followed by an expiration, as slow and long as possible. This mode of treatment was employed in the case of the semi-mute pupil in my school, to whom allusion was made on a previous page, and who stammered quite badly when he first came to us. The trouble soon disappeared almost entirely. It only recurred occasionally when he became nervously excited. I also found it very effectual to let him try to speak in as low a voice as possible—the attempt to speak low kept him from getting excited—and to let him practice before a glass, so that he could see any twitching or distortion of his face and try to avoid it. Since embarrassment of any kind was apt to aggravate his troubles, I generally took the precaution of letting him turn his face away from the class when he spoke, so that the other pupils could not see his struggles when he had any difficulty in speaking.

I would advise every articulation teacher to study some of the publications on the nature and cure of stammering. Prof. A. Melville Bell's treatise on the cure of stammering is the best English publication of this kind that I am familiar with. To those who read German, I would recommend the work of Albert Gutzman, teacher at the municipal institution for deaf-mutes in Berlin, Germany. We find in these publications a good many sug. gestions of which we can make practical use in

the teaching of articulation to our deaf pupils. Besides, persons afflicted with stammering or any other defect of speech are apt to come to us for advice and assistance.

After this digression, we will return to our main subject. The fact that the first condition of perfect and normal speech is a perfect and undisturbed action of the respiratory mechanism cannot be emphasized too much. We often find that the articulation of a deaf pupil is labored and sounds unnatural, because he mismanages his breathing. The only way to remedy such defects is to resort to regular breathing exercises. I will mention a very striking example of this kind. A little girl in one of the lower classes of my school spoke in a high, shrill, and disagreeable voice. None of the ordinary means of correcting faults of this kind had any effect. Watching her closely one day, I noticed that while she was speaking, her right collar-bone was laboriously moving up and down, as if it were performing the greater part of the work of her respiration. By calling her attention to this abnormal movement, and showing her how to use diaphragmatic and costal breathing, her voice improved, and finally, by making her fold her arms behind her back, the motion of the collar-bone was stopped entirely, and her voice was suddenly changed as if by magic.

In the following paragraphs I will describe some

breathing exercises which are recommended by competent teachers of elocution, and which will be found very practical and useful in the training of the voices of some of our deaf pupils.

The late Prof. Oscar Guttman, of New York, says in his book on "Gymnastics of the Voice": "Diaphragmatic breathing is best practiced in a standing position, with the head thrown backward and the arms folded behind." Folding the arms behind promotes diaphragmatic breathing to a considerable degree—more than any other position of the arms. I use this exercise in correcting a voice that is pitched too high, as was the case with the little girl that I mentioned.

"Clavicular breathing is best practiced if both arms are raised and the hands are folded on the back of the head." This exercise will be found very useful if the pupil's voice is too deep.

"The best position for practicing costal breathing is standing erect, with the arms hanging down on the sides of the body and the head slightly inclined forward." By this exercise a weak voice may be strengthened.

All these exercises are to be used in connection with voice and speech. I think this suggestion of Professor Guttman that all practice in breathing should be in connection with voice and speech is a very good one. It seems more natural to let the pupil say something, and to show him how to

manage his breath while he says it, than to have him stand up and do nothing but breathe.

Another, and also a very useful exercise for strengthening a weak voice, is thus described by Dr. Lennox Browne: "Place one hand lightly on the abdomen and the other on the lower ribs. Inhale through the nostrils, slowly, deeply, and evenly, without interruption or jerking. If this is done properly, the abdomen will gradually increase in size, the lower ribs will expand sideways, and the upper part of the chest will be pushed forward, while the collar-bones remain undisturbed. Now, hold the breath, not by shutting the glottis, but by keeping the chest expanded, and count four mentally, at the rate of sixty per minute. Then let the breath go suddenly. . . . The student must never, on any account, fatigue himself with these exercises; they may, however, be frequently repeated at intervals. . . . The time of holding the breath may be increased at the rate of two seconds per week until it can be held for twelve seconds. But the student should not try to go any farther, as infinite harm may be done by overdoing these lung gymnastics. Exercise in moderation, regularly repeated, will increase the breathing capacity and improve the voice."

LIP READING.

While treating the development of speech and the teaching of language to congenital and natural mutes, after the methods described in a previous chapter of this little volume, I have found it entirely unnecessary to provide special exercises in lip reading during separate school hours, because in this mode of teaching the pupil is made to use his eyes constantly in watching the movements of his teacher's mouth or of the mouths of his fellow-pupils. Lip reading, therefore, is so inseparable from all the class work, that the pupil acquires it incidentally, without any special effort on the part of the teacher. He learns to say his first little words by watching the movements of his teacher's lips and trying to imitate them, and for years to come he has to take from the lips every word that he adds to his vocabulary. Thus all the primary school work, with the exception of penmanship and drawing, affords continuous practice in lip reading.

In order to make the first steps easy, the following general rules, which were laid down by the late Moriz Hill in one of his works on deaf-mute teaching, should be observed in the instruction of beginners :

I. During the early period of the instruction, the teacher should speak as slowly as possible and articulate each sound distinctly.

II. To avoid confusion, such sounds that may be pronounced with the mouth in different positions, as *t*, *d*, *n*, *th*, *s*, should at first be given invariably with the same configuration of the mouth. Later on, a change of the position of the mouth may be introduced. It is to be recommended to let the pupil become accustomed to the various positions which the vocal organs may assume while these sounds are pronounced, so that he may not be troubled by them when he has to read the lips of strangers.

III. To guard against confounding sounds that are similar to each other—*e.g.*, *m* and *b*, *n* and *d*, etc.—such sounds ought to be frequently compared and pronounced alternately, until the pupil is certain in distinguishing "mother" from "butter," and the like.

IV. To give the pupils time to combine in their minds the several sounds, only small groups of sounds should be presented at first. Each syllable, if there are more than one in a word, should be pronounced separately, and a short pause should be made after each of them. The same rule applies when sentences are given.

V. Later on, however, we must let the pupil become accustomed to the usual mode of grouping words in a sentence, and pronouncing them in one utterance. We do not say, an apple, but *anapple;* not *here is your book*, but *hereisyourbook.* He

must be enabled, through practice, to take such a group of words from the lips as a whole without analyzing it into its constituent parts.

VI. Since lip reading can be acquired through practice only, and since there is no greater aid to lip reading than familiarity with spoken language, it is our sacred duty to speak to our pupils on all occasions, in school and out of school. All directions that have to be given should be expressed in spoken words; every new word that is taught should be presented first orally, and the pupil be compelled to read it from the lips before it is presented to him in writing; and in all the lessons, articulation and lip reading should be made the means of instruction.

VII. To give the pupils an opportunity of observing the teacher's mouth from all sides, and to read her lips from different positions, it seems advisable to let them change their places at regular intervals, say every week, so that they gradually complete a circuit around her desk, and every one of them is in turn sitting or standing right in front of her, to her right, and to her left.

VIII. Since the object of instruction in lip reading is accomplished only then, when the pupils can read, without difficulty, the natural, unaffected utterance from the mouth, not only of their teacher, to whom they have become accustomed, but also of other people, every opportunity should be

seized to give them practice in reading the lips of strangers.

All these rules are such as common sense dictates, and any intelligent teacher will arrive at them in due time and after sufficient practice and experience with deaf articulators. There are one or two more points to which attention should be called in this connection:

Beginners in articulation have to depend more upon the sense of touch in learning to imitate sounds and their combinations than upon their sense of vision; for it must be remembered that by far the greater part of the functions of speech is not visible to the eye. The sounding of the voice cannot be distinguished by the eye, nor can the emission of the breath through the nose or the mouth be perceived in that way. The deaf child can see you close your lips when you pronounce the sound of *m*, for instance, but he cannot see that you sound the voice, nor that you let the breath escape through the nose. He has to be made aware of all this by feeling. Some elements of speech are formed so far back in the mouth that their formation cannot be observed at all and have to be felt on the neck. Whenever our pupils see our vocal organs assume a certain position they have to remember that something is going on of which they have previously become cognizant through the sense of touch. Lip reading, there-

fore, is more a function of the mind than it is a function of the eye. That it may be characterized in this way is also proved by the fact that guessing plays a most important part in it. Take the word *bad*, for example. During its pronunciation the mouth presents the same appearance as in the words *bat*, *ban*, *mad*, *mat*, *man*, *pad*, *pat*, *pan*, etc. The deaf child can only distinguish it by guessing at it from its connection with the other words with which it is associated in a sentence. If he is not familiar with the words, the keenest eye-sight will avail him nothing. This is another reason, and a very powerful one, why familiarity with spoken language is the first condition of facility in lip reading. To gain that familiarity with language, deaf children require first, practice; second, more practice; and third, much more practice. The conscientious teacher will never let an opportunity go by, in school or out of school, to speak to her pupils and make them speak to her.

From the nature of the thing it follows inevitably that some curious mistakes are sometimes made by lip readers, and if it were not for the fact that no one likes to be entertained at the expense of unfortunates, a very interesting and amusing chapter on misunderstandings of this character might be added here. But there is great consolation in the fact that frequently hearing persons

also misunderstand what is said to them, and in consequence thereof make amusing blunders.

Appropriate gestures and facial expressions, such as we ordinarily use in speaking to a hearing person, are of great aid to the lip reader. But in speaking to a deaf person we are very apt to overdo the matter and make a more extensive use of gestures than is beneficial to such persons. A movement of the arm or of the hand is always more conspicuous than a movement of the mouth, and, therefore, diverts the attention of the lip reader from the face of the one who speaks to him. Care should be taken to avoid this fault.

In closing this chapter I wish to call attention to a most interesting and valuable treatise on lip reading, which was prepared by Mrs. Bell and read before the last summer meeting of the Association for the Promotion of the Teaching of Speech to the Deaf. No articulation teacher should fail to read her treatise.

LANGUAGE TEACHING.*

All the congenital and "natural" mutes of my acquaintance who use language freely and accurately were either taught by persons who had no knowledge whatever of any of the ingenious methods by which professional teachers of the deaf try

* Reprinted from the "American Annals of the Deaf," vol. xxxvii., pp. 267–279.

to initiate their unfortunate charges into the intricacies of English grammar and rhetoric, or they were so situated during their school life and afterwards that they had constant opportunities for practice in language by conversing with speaking people who did not follow any prearranged plan in these conversations. Take, for example, the case of Mrs. B., who became totally deaf at the age of four years. I met her first when she was twelve years old. She was a bright girl, full of life and fun, and used language as well as any hearing child of the same age. I was then shown letters written by her and giving descriptions of her travels. They were admirably worded and free from mistakes of any kind. No one reading them, without knowing their writer, would have suspected that they were composed by a deaf child. An inquiry as to the manner in which she had been taught language elicited the information that "her mother talked with her constantly, and she was compelled to depend upon speech for everything." "I thought of nothing," writes her former teacher, "but how to render my pupil like other children in the use and comprehension of language." Neither the mother nor the teacher had, at that time, any knowledge of the art of deaf-mute education.

A well-known gentleman, who has been deaf from birth, and whose language does not in any

way differ from that of an educated hearing man, wrote to me in answer to a letter in which I asked him how he was taught: "My father simply spoke to me as to his other children. As he was at home a great part of the time, I was with him, and when he was absent my mother, brothers, and sisters helped to instruct me."—Once I met a congenitally deaf young lady of sixteen whose language was entirely free from deaf-mutisms. She had been taught by her mother, who knew nothing of our "systems," and who told me that she taught that deaf daughter to speak by talking to her in the same way as to her other children.—A short time ago a little boy of ten years of age, who has been deaf from birth, and who is rather dull, was brought to me for examination. He has been taught at home by his mother, who knows nothing of the scientific methods of teaching language to the deaf. The child has a limited range of ideas, and talks on simple subjects only, but what he says is expressed in good English. He astonished me by using long sentences that invariably were well constructed.—I had a young lady in my school once who was totally deaf and was reported to have become so at the age of five months. When she was fifteen years old, and had been under instruction eight years, the principal of another school paid us a visit. After talking to this young lady for a whole hour, he turned to

me and said: "She has not used one single deaf-mutism yet." She was a day pupil, and her parents and sisters took a great deal of pains to talk with her constantly at home.—There is a little fellow in my school now who is eight years old and has been totally deaf over five years. He came to us two years ago and has been a day scholar. His parents take great pains with him at home. He talks a great deal, but never uses a sign. Although the language which he uses is not always correct, yet it is so quite often.—A deaf young man, whose intellect is decidedly weak, and who had made very little progress during the eight years that he has been in my school, has been at his home now for the last five years, and has received a good deal of attention from his parents and his brothers and sisters. His improvement in language is surprising. His thoughts are still as infantile as ever, but he almost invariably expresses them in connected and well-arranged words.

I know a good many more deaf persons, bright ones and dull ones, who in the natural, practical way have learned to use language well. Such results were unknown so long as the grammatical system held supreme sway in our schools. In an article bearing on this subject ("Annals," vol. xiv., p. 194), Dr. E. A. Fay makes the following remark: "In all the writer's acquaintance with deaf-

mutes . . he does not know one congenitally deaf person who uses language with the freedom and accuracy of an educated hearing and speaking man." This statement was made more than twenty years ago, and I am sure Dr. Fay would not apply it to his acquaintance with deaf-mutes of the present day. There is no doubt that the change in the condition of affairs is due entirely to the fact that of late years the conversational or natural method of teaching language, which he so ably advocated in the article referred to, has found favor, more or less, among instructors of the deaf. In the school under my charge this system has been practiced for a dozen years.

The plan which I pursue is in substance as follows: During the articulation drill, in the beginning of the course, the pupil becomes familiar with a number of single words and a few simple phrases. Ease of pronunciation and the immediate wants and requirements of the child determine the class of words that are taken up and the order in which they are taught. The teacher does not prepare a list of words which the pupil *must* learn, but she is constantly on the alert to seize every opportunity that presents itself for introducing little words. For instance, one little fellow makes the gesture for "home," which most new-comers are apt to do during their first days in school; the teacher tries to make him say the word "home." Another child

indicates by gesture that he wants a drink of water; he is made to attempt to say "water." A third child, showing an apple, or a ball, has to pronounce the names of these objects; a fourth one points to some picture on the school-room walls that attracts his attention, and some other word is introduced. Such opportunities for teaching words to express ideas which the pupils desire to convey are almost continually presenting themselves, even at the lowest stage of the instruction. If there is any lull, and the children have nothing to say, the teacher points to some object or picture and lets them try to pronounce its name.

It has been strongly urged by advocates of the conversational method that the instruction in language should begin with whole sentences and not with single words. "The process of nature requires us to begin by teaching sentences instead of words," says Dr. Fay, in his article which I have already mentioned. I do not know whether such a plan can be successfully carried out if the manual method is pursued, as I have never had any experience in teaching by that method; but I do know that if pupils are taught by articulation it is not feasible to begin with sentences. It is all the little deaf beginner can do if he imitates one word, but he cannot grapple with two or more words at once. If he learns to say "home" in the manner which I have described, this word stands for the

sentence, "I want to go home," but he is not yet able to pronounce and remember all the five words which compose the sentence; hence, we are satisfied, for the present, to accept the single word. As soon as he has obtained sufficient control over his vocal organs, and has learned to repeat words more readily, and can remember their meaning, such occurrences of the school-room as have previously been used for teaching the single words "home," "water," "apple," "ball," etc., are made the occasion for teaching the sentences, "I want to go home," "May I have some water?" "I have an apple," "I bought a ball." In doing this we are not at all acting contrary to the course of nature; for all hearing children, learning to speak, begin by making a single word answer the purpose of a whole sentence. "Pussy" means "The pussy has come into the room"; "hot" stands for "The food is too hot," etc.

The following is a list of some of the words and sentences which during the last school term were learned in this way by pupils who were spending their first year with us:

Papa, home, ball, bone, toe, eye, arm, fall, tall, top, bell, baby, thumb, shoe, marble, lamb, boat, hat, water, doll, mamma, muff, boy, hoop, man, table, flour, lamp, knife, tooth, mouth, fork, belt, horse, whip, bird, cap, comb, brush, pail, barrel, chair, cat, shovel, hoe, plough, cars, thimble, shawl,

fish, saw, apple, ladder, pole, pan, cow, mat, pipe, hen, gun, hammer, key, girl, book, bowl, fan, one, two, four, bee, house, three, window, mouse, door, towel, hair-pin, soap, pen, bottle, pencil, floor, deer, slate, paper, woman, sew, boot, broom, window-pole, coat, my, you. I will go home in the cars. A boy gave me a nut. It is cold. I am cold. I have new shoes. I ate some nuts. I had some coffee. We have a new boy. A man gave me a penny. To-morrow I will go home. The cat jumped on the table. Mamma bought some rolls. I like ham. The cat caught a mouse. I am warm. May I wash my slate? Nell has a doll. I will have a bath. I ate some turkey. A boy gave me some candy. The sun is warm. A man gave the horse some water. The barber cut my hair. My papa has a cow and a calf. A boy gave me a piece of cake. I played with the cat. My mamma made some rolls. A man fell from a horse. I walked in the park. I will be a man. I played tag with some boys. I will have a new hat. Mr. N. gave the boys new caps. I like potatoes. I love the baby at home. I can dance. My mamma made some cake. I have a cough. I saw a man shoe the horse. The man will fall. I gave an apple to a girl. A man caught some fish. May I have some water? I am sick. Shut the door. My papa gave me a doll. You have a new winter hat. I lost my knife. The girl has a doll's head. Two

men are rowing a boat. I gave Miss N. some flowers. How do you do? I am well. I washed my face. I sleep in the bed. I made a paper boat. The baby is fat. I will have a bath in the bath-tub. I laughed at the boy. I fell on the ice. I rode in a cab. I made a paper doll. I bought some candy.

From the promiscuous character of these words and sentences, and the manner in which they are presented to the pupil, it is evident that the teacher cannot prepare her lessons at this stage of the instruction any more than the mother or nurse of a hearing child learning to speak prepares regular language lessons for it. In either case the learner determines what the lesson is to be about, and he chooses what he wants to express either from necessity or from interest. Words and forms of speech which he is taught in this manner are sure to be appropriate and within his comprehension. Those from whom the hearing child learns to speak do not, as a rule, give regular lessons, but are for the greater part helping and correcting only. We carry out the same principle in teaching language to our pupils. We do not force upon them any particular parts of speech or particular forms of sentences after a prearranged plan. Our sole aim is to find out what the child has in his mind, and then we help him to express it; or if, in trying to express his ideas, he makes use of words

which he has previously learned, but does not use them right, we correct him. Most of the advocates of the natural method of teaching language cling to the idea that the teacher must have a prearranged plan in his mind as to the order in which words and forms of construction are to be introduced. But I differ from them all. In my opinion nothing is more calculated to pervert the purposes of the natural method than such prearranged plans. To prove the correctness of my views I refer to those deaf persons whom I mentioned in the beginning of this chapter, and who show better results in language than have ever been attained in any of our schools, and yet those persons were taught by their mothers and others who knew absolutely nothing about prearranging plans. If a man takes a course in French after the natural or conversational method because he contemplates a trip to France, it is well for his teacher to arrange his lessons so as to bring in forms of expression which his pupil will most likely have occasion to use. But in the case of deaf children, I say the way to teach them to talk is to talk with them.

Another notion which is quite generally entertained by teachers is that we must provide frequent reviews and repetitions of the words and sentences which are given to the pupil. My experience has taught me that there is no need of such reviews. There is a certain sameness in the circumstances and

surroundings of a child; therefore, the same little words and sentences naturally repeat themselves often enough if he is constantly required to talk; and, if the development of his language is allowed to take its own natural course, the words which he has learned will be applied again and again in ever-varying forms of construction. At the risk of becoming monotonous I ask, Did those mothers who taught their deaf children so successfully at home prepare reviews? We all know that vivid impressions are more readily retained by the memory than frequent repetitions. The interest which the child feels in what he wants to say is what helps him most to remember the form in which he is taught to express it. Repetition lessens this interest and does very little good. The school-time is more usefully employed if we get the pupil interested in something new and make him talk about it than if he is compelled to repeat old stories. It is the rule in our school that whenever one of the pupils speaks all the rest of the class must pay attention to what he says, so as to be able to repeat it and to write it down during the next special hour for writing. Now all the teachers of our lower classes find that when the writing hour arrives each pupil will reproduce his own sentences with fewer mistakes than he can write those of others. Due allowance must, of course, be made for the special attention that the teacher gives to

the child who makes a statement, and for the practice which that child has while he speaks. But, after making all such allowance, the fact still remains that generally the child is more interested in what he says himself, and in the subject about which he speaks, than in that which others say. It is this increased interest which helps him more than anything else to remember the language that he is made to use. We have also found that the dullest and most backward pupils, who cannot remember any sentences that were spoken or written by their classmates, often retain their own sentences, which they constructed with the aid of the teacher. And this can only be accounted for by the fact that usually the child feels a greater interest in the subject about which he speaks than in that which is discussed by others.

I now invite the attention of the reader to the following two lists of sentences, which are given without correction. The pupils who wrote them had been asked by their teacher to write anything that they remembered from their recent exercises in conversation. List No. 1 is the production of a little girl of ordinary intelligence, who is nine years old, became deaf at two years of age, and has been in school seventeen months, previous to which date she did not have any instruction. List No. 2 was prepared by a girl who is quite dull, thirteen years of age, deaf since she was two

years old, and under instruction two years and a half.

I. "I saw a red table cloth on the table. There is a door bell on my mamma's house. My mamma has a large sofa at home. Is the sofa pretty? Yes, ma'am. I will eat *bred* and butter *of* supper. I saw a soldier on the boat. I saw a man have a shovel. My mamma bought *her* a white muff. I will eat some strawberries and sugar. I saw a man plough the ground. I saw a large church. Juliet will go home with her papa in the cars. Mamma has two sponges in the bath room. I caught some fish with a fish pole. The lamp is on the hook. I will go home in the cars. I saw a boat on the water. The mouse will go in the *prat.* I wash my face and hands with soap. I have some candy in my pocket. I saw a man in the water."

II. "I have many buttons on my ——. Can you sew on buttons? Yes, ma'am. I saw a red table cloth on the table. My mamma has a large sofa at home. Is the sofa pretty? Yes, ma'am. I saw a —— on the wall. Can the —— run? Yes, ma'am. I saw a man on a ladder. My mamma has a sewing machine at home. My mamma put some sugar in the *lamonde.* My mamma bought some nuts in the store. My mamma bought a can of corn. I saw the servant poke the fire in the stove. I saw a tiger *on* the park. Can the tiger bite?

Yes, ma'am. My mamma has two sponges in the bath *roon.* I saw a man plough the ground. Juliet will go home with her papa in the cars. I caught some fish with a fish pole. I will go home in the cars. I wash my face and hands with soap. I have a tooth brush up-stairs."

It will be noticed that in No. II. there is a word omitted here and there and a place left blank for it. The words which are left out were new, and the pupil had learned to pronounce them, but had not yet been taught how to write them. It is one of my principles, in teaching language, to let speech precede writing. The reasons for adopting this principle, and the advantages resulting therefrom, are fully set forth in my treatise on "The Word Method," which was published by the American Association to Promote the Teaching of Speech to the Deaf, in its Circular of Information, No. 1. I therefore refrain from descanting on this subject here. Another point which may strike the reader of these two specimens of language exercises is the infrequency of the use of the interrogative form, list No. 1 containing only one question, and No. 2 containing four questions. In the grade to which the pupils who wrote the exercises belong, the teacher asks one or more questions in connection with every topic that is broached. The pupils are not sufficiently advanced to formulate questions, and do not remember them so well as they do

their own statements. It has been my experience that pupils invariably learn to understand questions and to answer them long before they are able to construct a sentence in the interrogative form.

In our lowest grade the topics for conversation are suggested by actual occurrences in the school-room, and by pictures. The following is a specimen of a language exercise with a class of pupils whose conversation is just beginning to turn on happenings outside of the school-room, which they bring up voluntarily and which are not suggested by pictures before them. This change in the subject-matter of conversation takes place in due time without any special effort on the part of the teacher. But as soon as she notices the first indication of it she encourages the children to talk about outside matters and to tell what they have seen or done on the play-ground, at their homes, in the street, etc.

"I spilled some coffee on my apron this morning. Did you wash the apron? No, Emma. We saw Viola's friend in the street. What is her friend's name? I do not know. We will have fish for dinner. Do you like fish? Yes, Amelia. Eva hurt her hand. Did she go to the hospital? Yes, Bernard. Viola took medicine. Who gave it to her? The nurse. We saw a dead bird in the yard. Who killed it? I do not know. I went home last Friday. How did you go? On the

cars. We played school in the play room. Who was the teacher? Viola. I saw a large dog in the street. Were you afraid of it? No, Hattie. A boy sweeps my father's store. Does he sweep it every day? Yes, Louise. We saw a blind man in the street. Did some people give him money? Yes, Alfred. A horse fell in the street. Did some men help it up? Yes, Tilly. I will go to the country. When will you go? In summer."

The following exercises were used in a little more advanced grades. It will be seen that there are more questions asked, and the topics are discussed more exhaustively:

I. "Theodore broke a branch off the tree. Is the tree by the fence? Yes, Rufy. What color do you think the —— will be? They will be pink. What kind of fruit grows on the tree? Peaches grow on it."

II. "Last Tuesday afternoon Ellis saw a man driving very fast. Were there many people in the street? Yes, Charlie. Did he pull the lines hard? Yes, Willie. Did the horses gallop? Yes, Arthur. Were they frightened by the cars? No, Theodore the driver whipped them hard. Was there a lady in the carriage? No, Ruth; there were two men. Did a policeman arrest the driver? Yes, Ethel."

III. "Last Friday evening Miss R. petted a kitten. Where did she get it? One of the boys brought it from the cellar. Did the boys make a box for

the kitten to sleep in? Yes, Katie. How many kittens are there in the cellar? There is only one now; there were five, but four of them have disappeared. Did Miss R. enjoy petting the kitten? Yes, Helen."

These conversational exercises or free discussions of any subjects that the pupils are interested in are continued throughout the greater part of the course. But, while at the lowest stage of the instruction almost the entire school-time is given up to them, the number of hours that are daily devoted to them gradually decreases, as regular studies, such as reading, arithmetic, geography, history, form-study, physics, chemistry, physiology, etc., are introduced. All the lessons on these subjects are given in the form of questions and answers, and the pupils recite very little from books, so that in reality, even in the highest class, there is conversation going on all the time except during drawing hours, the only difference being that the little children talk about common things and the older ones discuss topics of geography, chemistry, etc.

When an ordinarily bright child has been in school about two years we begin to aid the instruction in language by a course of reading-lessons. I use for this purpose the sets of reading-charts for common schools that have been published by D. Appleton & Co., A. S. Barnes & Co., of New York; Butler & Co., of Philadelphia, and others.

I find these charts better adapted for teaching language to little deaf children than the common school readers, which generally contain stories covering a whole page, or sometimes two or three pages. To explain all the language of such a story in one lesson is impossible, and if several lessons have to be spent on one and the same story on different days the children become tired of it. They learn more if in each reading hour a fresh chart is placed before them, with an interesting picture and a few sentences printed under it, such as, "Ned fell from his sled," etc. I let them read that sentence and then ask a good many questions about it: Do you think Ned was hurt? Will he get on his sled again? Who gave him the sled? Did he make it himself? Have you a sled? Who gave it to you? Where do you keep it in the summer?

To increase the vocabulary of pupils who have been in school two or three years, and to make them familiar with colloquial language, we give them a series of lessons on common things, of which the following are specimens:

I. How many pupils are there in this class? How many boys? How many girls? Are all the pupils of this class present? How many are absent? How long has —— been absent? What is the cause of his absence? Is he sick? What is the matter with him? When do you think he will come back to school? What is the number of this

class-room? Is it a large room? How many windows has it? Are the windows large or small? How many panes of glass has each window? Are all the windows the same size? Are all the panes of glass the same size? What color are the window-sashes? Are there any curtains to the windows? Are there any shutters? Are any of the panes of glass broken? Who broke them? Who will put in the glass? How many doors has this room? How many panels has the door? Has the door a lock? How many hinges has it? What kind of a knob has it? What color are the walls of this room? Are they papered or painted? What color is the ceiling? How is the room lighted? Has this room a closet? How many shelves has the closet? What do we keep on the upper shelf? On the lower shelf? How many black-boards are there in this room? Is the black-board fastened to the wall? Does it stand on an easel? Can you move the black-board? With what do you write on it? Are there any pictures on the walls of this room? Do the pictures hang on hooks? Are they new? Are they framed? What kind of frames have they? How many desks are there in this room? How many pupils sit at one desk? Who sits at the same desk with you? What do you keep in your desk? Is your desk fastened to the floor? Can you move it? What kind of wood is it made of? Is it comfort-

able? How is this room heated? Are there any steam pipes in it? Are the steam pipes fastened to the wall? Are there any valves on the steam pipes? Do you know how to turn the valves? Which way do you turn them to let in the steam? Which way do you turn them to shut off the steam? Do they turn hard? Does the sun sometimes shine into this room? At what time of the day does it shine into the room? Do you like a sunny room? What kind of a floor has this room? Who sweeps the floor? When is it swept? When is it washed? Who dusts this room? Who cleans the windows? On what floor is this room? Are there any other class-rooms on this floor? How many class-rooms are there on this floor? What class is in the room next to this? What floor is below this? What floor is above this? How many stories high is this building?

II. What day is this? What day was yesterday? The day before yesterday? What day will to-morrow be? The day after to-morrow? What is the first day of the week? What is the last day? Can you tell me something that happened a week ago to-day? What day of the month is this? What day of the month will be a week from to-day? Two weeks from to-day? On how many days of the week do we have school? What month is this? What was the last month? What will be the next month? What is the first

month of the year? The second? The third? The last month of the year? In what month is Christmas? What day of the month? In what month is Thanksgiving day? In what month is Decoration day? On what day of the month? In what month is Washington's birthday? In what month is your birthday? What time is it now? What time will it be in fifteen minutes from now? What time was it one hour ago? At what time does school begin in the morning? At what time does it close? How many hours are you in school in the morning? How many in the afternoon?

In a similar manner the dining-room, the bed-room, the play-room, and what happens in them; a ride in a street-car, a visit to the store or the theatre, etc., are made the subjects of language lessons in the lower classes. In the advanced classes, where the pupils use ordinary text-books and read the daily papers, their language takes care of itself, so to say. At no stage of the course is any of the school-time given up to lessons on particular words or on grammar. If I am not mistaken, the school under my charge is the only one in which the recommendations which Dr. E. A. Fay made in this regard are carried out. He says: *

"Every child learns to speak copiously, fluently,

* *Op. cit.*, p. 201.

and idiomatically without having the slightest idea of the rules of grammar; a man who has committed a dozen grammars to memory may be able to do neither. The study of grammar is unnecessary, because the language may be fully learned without it: it is worse than useless, because the time given to it is needed for the acquisition of language; it is an actual injury, because it distracts the pupil's mind in composition by leading him to depend upon his recollection of rules to determine the inflection and order of words, instead of his consciousness of what is right, resulting from reiterated impressions."

To these remarks of Dr. Fay I wish to add what Dr. W. A. Hammond, the great neurologist, who probably knows as much about the human brain and its functions as any other living man, said more recently in the *Popular Science Monthly*, vol. xxxvii., p. 726:

"As for grammar, it should be banished from all schools, except, perhaps, from the senior year of a university course. No child ever learned to speak good English from studying grammar. It has driven many a poor little wretch into headaches and other nervous troubles. It is the most ingenious device for forcing an immature brain into early decrepitude that the cunning of man has yet devised. The only reason why it does not do more harm is that not one-tenth of the pupils that

come out of our schools know anything about it."

Since the teaching of grammar and all exercises on the grammatical plan were entirely omitted from our programme, and the time which was formerly devoted to them has been spent in actual practice in talking, our pupils do not use half the number of deaf-mutisms that we had to struggle against in previous years. They learn to understand language much quicker, are more apt to use it spontaneously on all occasions, and reach that stage when spoken language can be used as a means of instruction in the ordinary branches of knowledge in less time than formerly, when we used the grammatical system. During the last school term two congenital mutes, one of whom had been in school six years and the other seven years, were promoted into our highest class. In former times, when we followed the grammatical plan of teaching language, pupils of that condition had to work hard for ten years before they were prepared to enter our first grade. I remember that in past years I was often compelled to adapt my language to the deaf-mute style of talking, and to make use of natural signs when I attempted to give a simple lesson in geography, for instance, to a class of pupils who had been in school five or six years. Now I can give a similar lesson to pupils of three or four years' standing without

making a single sign, and am able to use language which, although very simple, yet does not vary much from that which we use with little children who can hear. We all know that as soon as a deaf child reaches that stage at which spoken language can be used as a means of instruction, the worst of the battle is over, and the rest is only a question of time.

Some teachers of the deaf have told me that they had tried the conversational method, but had to abandon it on account of lack of suitable topics to interest the pupils. In our school we hardly ever experience difficulties of that kind. The children seldom fail to have something to say and almost always seem ready to talk. The day pupils bring in a good deal of news, and although the resident pupils are at a disadvantage in this regard, yet they take a walk every morning before school begins, and always see plenty to interest them in the busy and lively streets of the city. I can readily understand that if a school is situated in or near a small town, its pupils lack these opportunities, and, therefore, will not be apt to be full of interesting news when they enter the classroom. But the human brain is never idle any more than the lungs or the heart stands still while life lasts. Therefore, the children's minds must always be occupied with something. If the teacher will only take the trouble of finding out what they

are thinking about, she will soon get a conversation started. Hearing children who are growing up in lonely homes, and among surroundings that are entirely void of interest, learn to talk. Why should not deaf children find enough to talk about? No matter how small an institution is, life in it can never be so lonely and uneventful as it is in some families.

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